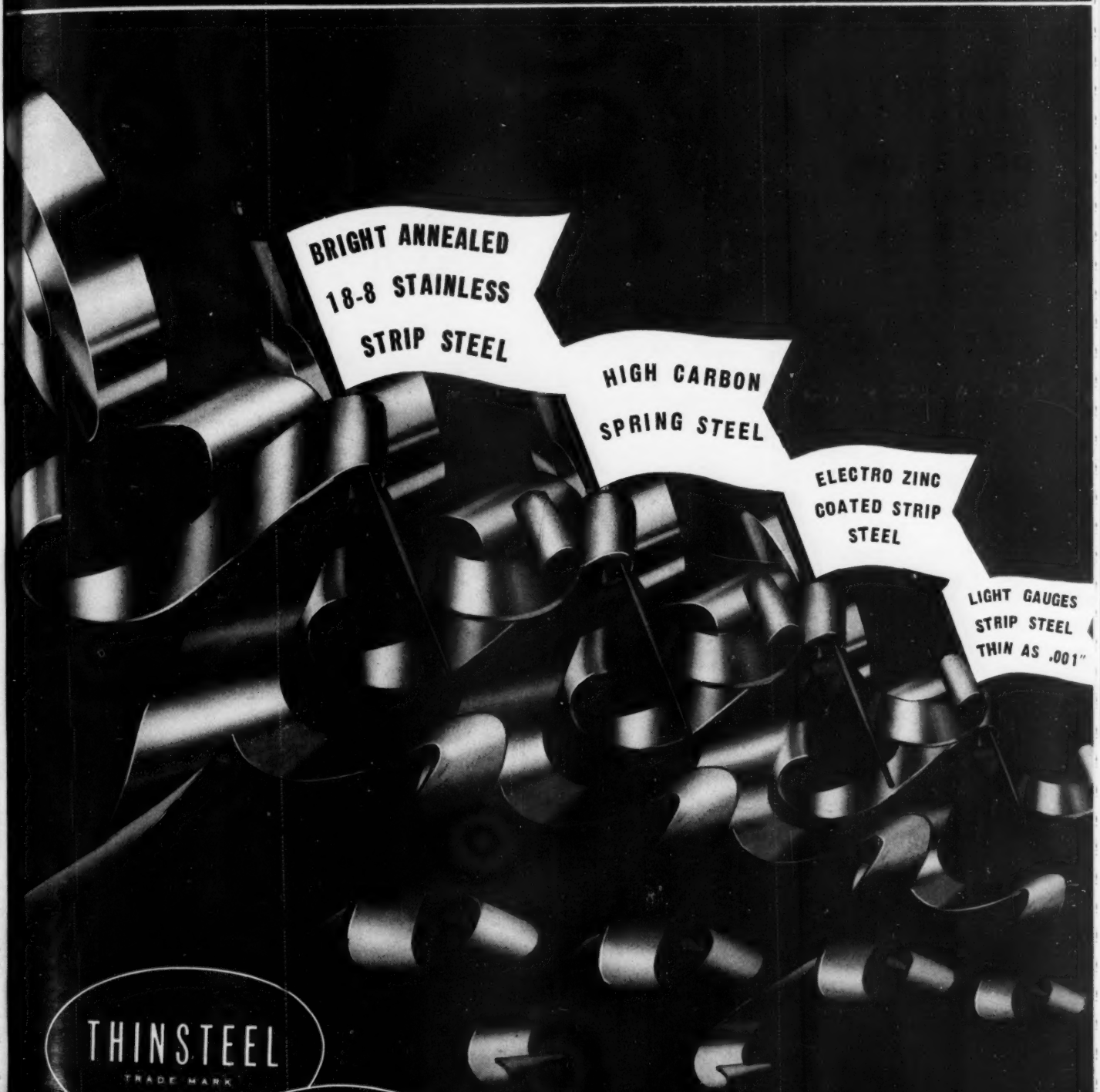
STEEL

The Magazine of Metalworking and Metalproducing



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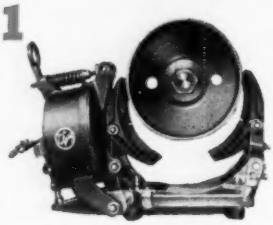

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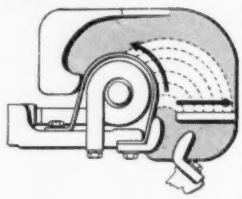

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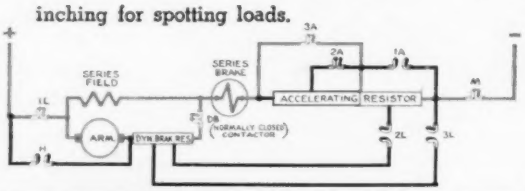

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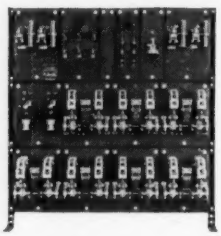

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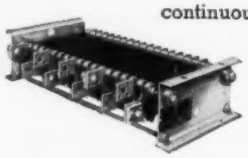

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H-Band Steels Offer Aid to Heat Treaters

New Developments In Electrodeposition

Molten Salt Bath Descaling Process Cuts Production Time

STEEL

The Magazine of Metalworking and Metalproducing

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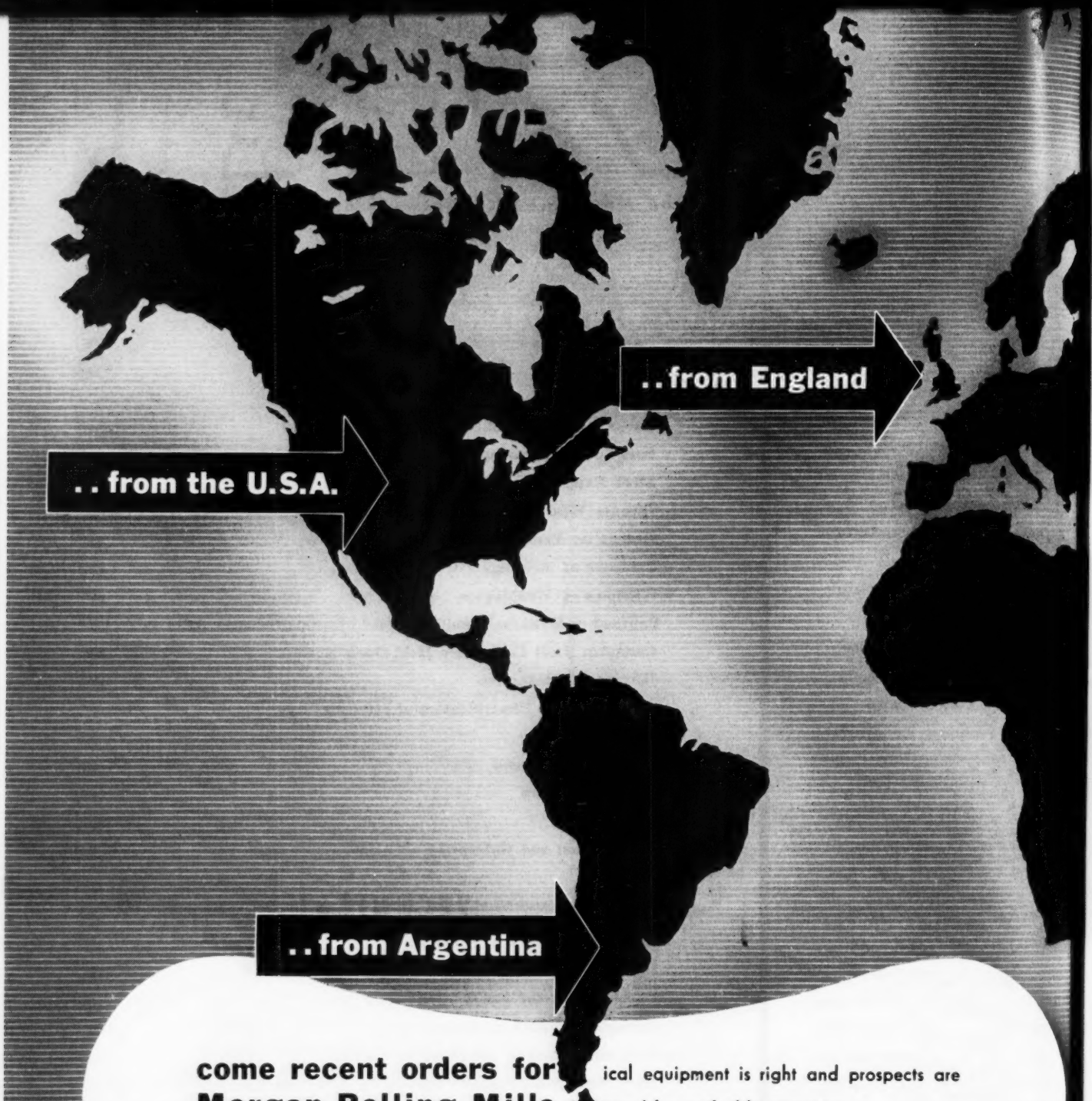

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MORGAN WORCESTER

December 6, 1948

Go Slow on T-H!

If one were to believe half of the statements made since election day by exultant spokemen of the Truman administration and of the principal labor unions, he would be forced to conclude that this nation is to be run by a "labor" government. To listen to Secretary of Labor Tobin, CIO President Murray, AFL President Green and others, one would think that the vote of Nov. 2 was a mandate by the people to give labor a free hand in government affairs.

Analysis of election returns shows that no such mandate is justified. In state after state, Dewey made a better showing in industrial areas in 1948 than he did in 1944 and Truman made a better showing in the rural counties in 1948 than Roosevelt did in 1944. While labor deserves much credit for a painstaking job of getting out a big vote, it was the unexpected shift of the farmers' vote to Truman and the inexcusable failure of many Republicans to vote because of over-confidence, as much as any effort of organized labor, which gave President Truman his narrow margin of victory.

Nevertheless, it is true that labor now is in a position to ask much of President Truman and of the 81st Congress. One of the first tests will come when the Administration tackles the problem of labor legislation. Secretary of Labor Tobin told the AFL convention that repeal of the Taft-Hartley Act would be accomplished within 30 days after the new Congress convenes. Even labor leaders are suspicious of such precipitate action. Wisely they see need of legislation to take the place of T-H, before T-H is scuttled.

Another factor is the attitude of the new Congress. Its members are not going to relish legislation that is served to them on a silver platter. They will want to exercise their right to make the nation's laws. Also, it should be remembered that a majority in each house of the 81st Congress voted for T-H in the 80th Congress.

Far above all other considerations is that of the public interest, which clearly demands that some of the features of T-H be retained as a necessary protection against the admittedly one-sided features of the Wagner Act.

* * *

FROM THE BOTTOM UP: At the 300th general session of the National Industrial Conference Board, James E. McCarthy, dean of the College of Commerce, University of Notre Dame, asserted that the United States has arrived at the stage where government has stepped out of its position of servant to assume the role of master. In its relations with business, continued the dean, government acts on the erroneous theory that it is not the protector but the arbiter of economic morality.

He says that in order to restore the proper relationship between government and business, American business leaders must revive lagging public confidence in private enterprise and develop means to defeat "the highly organized, highly financed illiteracy in our country."

This is an excellent, concise statement of industry's present public relations problem. How to defeat strongly entrenched illiteracy is the key to the problem. Present attempts of industry to win public understanding by means of advertisements in newspapers and of addresses by speakers sponsored by industry as-

(OVER)

AS THE EDITOR VIEWS THE NEWS

sociations are largely ineffective because the message seldom gets to the eyes or ears of that portion of the public which is in greatest need of correct information.

It is difficult to see how any national educational campaign, operating from the top down, can penetrate deeply enough to be successful. On the other hand, if industry's public relations job were tackled at the bottom, and were performed uniformly well at the plant and local community level, in time the result would be gratifying on a national basis. —p. 84

* * *

OFFERS TO CO-OPERATE: It is too early to predict the outcome of the prolonged and tedious discussion of the effect of recent Supreme Court decisions and Federal Trade Commission rulings on pricing practices. However, last week FTC made a gesture that may prove to be significant. FTC Chairman Robert T. Freer advised Senator Homer E. Capehart that it is the commission's wish to co-operate as fully as possible in eliminating existing confusion with respect to pricing.

Heretofore, FTC had either denied that confusion existed or at least contended that there was no need for clarification. Time alone will determine whether Commissioner Freer's statement reflects a real change in FTC attitude.

Meanwhile, avowed opponents of "big business," such as Representative Wright Patman and Senator O'Mahoney, are inveighing against congressional meddling with anti-trust laws as a result of the Capehart investigation. They seem to ignore completely the economic impact of pricing upon the nation's consumers and to be concerned only with the legality of the pricing systems employed by the sellers. —p. 83

* * *

BREAKS FOR TAXPAYERS: Out of the welter of Washington news, much of which points to the probable expansion of the already over-extended activity of government in private affairs, come two items which provide a modicum of satisfaction to long-suffering taxpayers.

One is the apparently sincere determination of President Truman to encourage ex-President Hoover to complete his study of the executive branch of government and to present his recommendations in January. The report, even if adopted only in part, would improve the organization of numerous federal agencies and would reduce government expenditures appreciably.

The other item of welcome news is that War Assets Administration, which at one time had a payroll of 60,000 persons, will go out of business on Feb. 28, 1949, as scheduled. The mop-up job of disposing of government-owned surplus property remaining after that date will be portioned out to Reconstruction Finance Corp., Bureau of Federal Supply and the Air Force. —p. 92

* * *

STEEL HOST IN CANADA: Steel Co. of Canada Ltd. at Hamilton, Algoma Steel Corp. at Sault Ste. Marie and Atlas Steels Ltd. at Welland have been holding "open house." As a result more than 50,000 Canadians have witnessed operations in plants which account for over two-thirds of the Dominion's steel ingot output.

It is reported that the reaction of the public to these plant visitations was highly gratifying. Visitors came away with a better understanding of the importance of the steel industry to the Canadian economy.

It is not easy for a steelworks to play host to the general public. Months of preparation are required to work out details so that the visitors can be conducted to the various points of interest in comfort and in absolute safety, and yet at the same time be given enough information to enable them to understand what they are seeing. The success of these "open houses" is a tribute to Ontario's steelmakers. —p. 94

* * *

FORGING SERIES ENDS: If you were to overhear a group of workmen discussing their work and using such terms as check, gutter, fin, mismatch, flash pan and sow block, would you know what they were talking about? If you recognized these words as part of the jargon used in the commercial forging industry, you would be correct.

These six expressions were taken at random from the exhaustive glossary of terms which appears in the fourteenth and final installment of the series of articles on "Fundamentals of Forging Practice" by Waldemar Naujoks. Also included in the final installment are useful tables on tapers for draft angles; maximum forging temperatures for carbon, alloy and stainless steels; and weights of forging metals. —p. 121

E. L. Shaner

EDITOR-IN-CHIEF

News Summary

ALLOCATIONS— Proposed additional voluntary allocations of steel are not expected to cut deeply into the supply of "free" steel available to the general trade. Tonnages required for the mining machinery program and increase for the barge and merchant ship programs largely will be offset by tonnages now going to programs to be discontinued after February (p. 83). Meanwhile prospects for continuance of the voluntary program are looking better. Commerce officials have thrown their support behind the voluntary plan, against the mandatory allocations urged in some congressional quarters.

LABOR AWAITS PAYOFF—Radiating high confidence as result of their role in the November elections, top labor leaders are making big plans for the future. They expect to receive close attention to their recommendations for legislation by the 81st Congress and for new political appointments by the administration (p. 84). A fourth round of wage increase demands has been sanctioned by all the major unions, although the emphasis may be placed upon real wage increases rather than money increases. Internally, the unions are moving toward the right and red elements are being purged.

FIVE MILLION CARS— Automobile output in the first 11 months of 1948 exceeded 5 million units, nearly equal to last year's entire output, and presaging a 5½ million total for the 12 months (p. 97). Notwithstanding the sustained high production, builders foresee a tight market for at least 12 to 18 months ahead; from the field, however, come occasional reports of softening in demand at present prices.

AUSTRALIA BUILDS AUTOS— Start of production of automobiles in Australia became a fact when the first Holdens rolled from assembly lines at General Motors plants down under. Ninety-five per cent of the components and parts will be made in Australia, with some 600 suppliers involved (p. 97). The Holden is a light-weight unit, with 103-inch wheelbase and 6-cylinder 60 horsepower motor. Road clearance is high, 8½ inches, a necessary feature for Australian roads.

POWER SHORTAGE— Mandatory power curtailments for the Pacific Northwest are threatened if present voluntary conservation measures are not effective (p. 87). Studies presented at a Seattle conference emphasize the shortage of power facilities which may impair operation of northwestern industries and possibly atomic energy plants at Hanford. Construction of additional power facilities by the federal government is desired by industrialists in that area.

CANADIANS SEE STEEL PLANTS— Three of the major Canadian steel producers opened their gates recently and invited the public to come, look and learn. More than 50,000 visitors (p. 94) were guests at Algoma Steel Corp., Steel Co. of Canada and Atlas Steels Ltd. open houses patterned after the traditional American custom.

EXPORTS DECLINE— Shipments of iron and steel to foreign countries (p. 86) during the first nine months of 1948 were 1.5 million tons below the comparable 1947 figures. The decline in exports, which started early this year, is becoming more marked, with each recent month showing lower shipments than the preceding period.

HERE AND THERE IN INDUSTRY— Electrification of its 140-inch breakdown mill has been started by Lukens Steel Co. (p. 100). Since 1903, the mill has been driven by a steam engine . . . War Assets Administration (p. 92) is preparing to go out of business Feb. 28 and is laying off its employees . . . Use of blast furnace slag (p. 92) in construction and agriculture is increasing. . . Maremont Automotive Products Co. (p. 100) has acquired the E. R. Merrill Spring Co., New York . . . More drastic curbs on bank loans are being considered (p. 90) by the administration.

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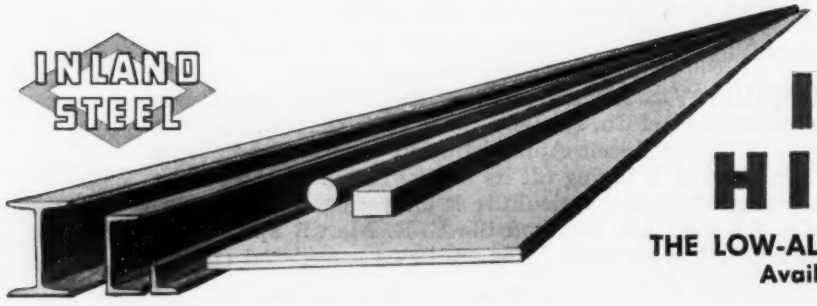

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Voluntary Allocations Favored

Commerce Department officials reported throwing weight in favor of continuance of program as against mandatory steel controls. President may ask for standby authority

FUTURE of the voluntary steel allocations program is uncertain but it looks as though the plan has a good chance of being extended beyond the Feb. 28 expiration date. At any rate indications are it will not be supplanted by strict mandatory allocations such as urged in some congressional circles lately.

Only last week Sen. Joseph C. O'Mahoney (Dem., Wyo.), who is expected to head the powerful Senate-House Economic Committee in the 81st Congress, said that as long as shortages exist in the basic commodities there should be government allocation. However, the most President Truman now is expected to seek is standby mandatory powers for use in case the voluntary plan breaks down, or in event of an emergency.

Works Out Well—Commerce Secretary Sawyer has just put in a good word for the voluntary plan though he declines to state whether he will ask for its extension. He says the program has worked out well so far and that the steel producers are cooperating satisfactorily in its administration.

Recent action of the Steel Producers Advisory Committee to the Office of Industry Co-operation in approving extension of eight existing voluntary steel allocation programs, at the same time approving one new one and sanctioning development of several additional agreements in the national interest may prove to be the deciding factor in preventing replacement of the voluntary arrangement with mandatory allocations early next year.

Commerce Department officials who had been keeping their fingers crossed with respect to the voluntary programs now have come out unequivocally for continuation of the voluntary method and they are prepared to meet criticism of other government agencies and departments, as well as congressmen, with proof that the steel industry is co-operative and that the voluntary method is working out.

Would Not Work—Further, they are prepared to prove that mandatory allocations would not work any better than the voluntary plans in taking care of many diversified steel demands for the simple reason that there is not enough steel available to meet all demands, and mandatory controls would not eliminate the shortages.

Commerce officials questioned about what other allocations programs are contemplated told STEEL that several programs involving nonferrous metals now are under study but they feel confident that these situations, like the steel situation, can be taken care of by the voluntary approach.

Bite Not To Be Too Deep

PROPOSED additional voluntary allocation of steel is not expected to cut very much more into so-called supplies of "free" steel available for the general trade.

Something like 26,400 tons monthly are involved in the proposed allocation for mining machinery construction and maintenance. An additional 5000 tons monthly for inland barges are proposed, and 5000 tons more monthly for merchant ships. The proposed ore cars for South Africa will require only 2576 tons monthly through February.

CHARLES SAWYER

Drop Some Programs—The total additional tonnage in these allocations just about equals the 41,500 tons involved in three current programs which are to be dropped at the end of February as no longer essential. However, steel industry representatives have indicated willingness to supply steel necessary for grain storage facilities, estimated around 50,000 tons, and have also requested government officials to put in specific figures on estimated additional steel requirements for oil storage equipment. It is possible that when all the figures are in, the new requirements will more than offset, but not by a great margin, those tonnages being dropped from allocation.

Schedule Allocation Hearings

OFFICE of Industry Co-operation has scheduled several public hearings to consider proposals for the allocation of steel. Two hearings will be held Dec. 7. One will consider the request of the Munitions Board for allocation of 2576 tons monthly to Feb. 28 for the manufacture of ore cars to be used in moving manganese ore from South African mines to tidewater, the cars to be built by the Canadian Car & Foundry Co.

The same day a hearing will be held to consider allocation of 26,400 tons monthly for the manufacture of mining machinery, a program which was approved at the last meeting of the Steel Products Advisory Committee.

On Dec. 8 and 9 hearings will be held to consider continuation of five programs now in effect.

No Air Force Warehouses

REPORTS that the Air Force planned to establish its own steel warehouses were denied last week by a spokesman for the department. He said the Air Force does not contemplate warehousing any materials used by its contractors, and said this would be needless unless the voluntary allocations program is allowed to expire and is not replaced by some other control under which military suppliers would be assured of materials.

FTC To Confer on Pricing

FEDERAL Trade Commission will cooperate with the Senate Trade Pol-

icies Committee in working out a solution of the pricing problem business and industry face as result of FTC rulings and court decisions against basing point and similar pricing.

This became known last week when FTC Chairman Robert T. Freer advised Sen. Homer E. Capehart (Rep., Ind.), chairman of the Senate investigating committee, it was the commission's wish to co-operate as fully as possible in eliminating existing confusion as to legal pricing.

Senator Capehart had written the commission the week preceding suggesting his committee meet with the commission, and that the commission's official views on the basing point question be made a part of the Senate committee's record.

Concession—Since it has been presumed right along the Capehart Committee hearings were aimed at developing the basis for new legislation legalizing freight absorption, acceptance by the FTC of Capehart's suggestion for a meeting is taken as meaning the commission is willing to discuss the possibility of such clarifying legislation. This would seem something of a concession on the part of the FTC which heretofore has indicated there was no need for additional legislation.

Meanwhile, Rep. Wright Patman (Dem., Tex.) appears getting ready to vigorously oppose any proposed change in the anti-trust laws which might be suggested as result of the Capehart investigation.

Representatives of the Army and Navy, testifying before the Capehart Committee last week, gave qualified approval to basing point and similar pricing. In cautious statements they said they prefer to continue their present methods of buying which give manufacturers the right to include freight charges in their prices.

Divergent Views on Pricing

HIGHLY divergent views on the basing point question were presented by two speakers at the 300th general session of the National Industrial Conference Board in New York.

Walter B. Woodin, of the Federal Trade Commission, declared if business should be able to bring sufficient pressure on Congress to nullify the Supreme Court decision in the Cement case, free enterprise and political democracy would be seriously threatened. Further, he charged that if there should be an economic collapse "the monopolistic devices and practices which the commission has exposed and challenged will not be guiltless."

Opposing View—The opposing view

PHILIP MURRAY
His legislative aims coincide with President's

was expressed by Harold J. Gallagher, partner, Willkie Owen Farr Gallagher & Walton, a law firm of New York City. He took the position "that revision of the heretofore accepted pricing system will do exactly what the anti-trust laws were intended to prevent, namely, to create monopolies and restrain competition by eliminating all competition from the geographical territory in which the favored plants (under the Supreme Court decision) are located."

Asserting that this country has arrived at the stage where government has stepped out of its position of servant to assume the role of master, James E. McCarthy, dean, College of Commerce, University of Notre Dame, South Bend, Ind., said that actually government writes the practices and indicates the policies by which industry must conduct itself if it is to function at all. Government does this, he said, on the erroneous theory that it is not the protector but the arbiter of economic morality.

To restore proper relationship between government and business, American business leaders must revive lagging public confidence in private enterprise, and to do this, in turn, they must develop means to defeat "the highly organized, highly financed illiteracy in our country."

Labor Ready To Collect

Expects greater voice in government as payment for November support

BIG LABOR, riding the crest of a new wave of power as result of its display of strength in the November elections, will lose no time in attempting to translate its program into action.

This was apparent throughout the sessions of the recent conventions of the Congress of Industrial Organizations in Portland, Oreg., and the American Federation of Labor in Cincinnati.

Labor intends to have its say in high political appointments in the new Truman administration. Its influence will bear heavily in the 81st Congress in the drafting of new social and economic legislation.

On the bargaining front, all the major unions are committed to demands for fourth round wage increases. These may be fairly moderate and may be tempered by whatever progress is made toward curbing prices.

Internally, the big unions have started all-out war on communism. An effective purge of the red elements in organized labor appears to be in the making.

Economic Program — Legislative aims of the unions are similar to those of President Truman. CIO President Philip Murray has outlined an 8-point economic program calling for an excess profits tax, price control, rationing and other steps asked by the President. In detail, Mr. Murray asks:

1. Price control to insure that "consumer income does not suffer . . . and that a halt is brought to declining purchasing power."
2. Excess profits tax "to prevent industry from reaping all the benefits."
3. Anti-monopoly action to prevent the "price structure being frozen at present level" and permitting "downward adjustments to take place."
4. Allocations, rationing and inventory control to assure that "commodities and foods get to the proper places, the proper people, at the proper time."
5. Farm prices support to assure "the bottom does not fall from underneath farm income."
6. Minimum wages of at least $1 an hour, social security legislation and other similar measures to protect the industrial workers.
7. Low-cost public housing.
8. Expansion in capacity of such

basic industries as steel, electric power etc. "sufficient to meet all present and foreseeable demands."

Labor Legislation — All the major unions are united in their demands for repeal of the Taft-Hartley Act and the rebuilding of new labor-management relations laws on the foundation of the Wagner Act.

Secretary of Labor Maurice J. Tobin told the AFL convention that repeal of the Taft-Hartley Act would be accomplished within 30 days after the 81st Congress assembled. Union leaders, however, generally are pointing toward action by Mar. 1. They now are warning against T-H repeal before replacement legislation is readied lest a hiatus occur, during which there would be no law to govern labor-management relations.

The unionists are paying little heed to the fact that a majority of members of the 81st Congress voted for the Taft-Hartley Act in the 80th session.

Fourth Round — Sanction for a fourth round of postwar wage increase demands was given by the CIO at its convention. AFL, United Mine Workers and other unions had gone on record earlier for a fourth round.

However, labor is approaching the wage increase issue somewhat more cautiously than in former years. Some of the union people are weary of the spiral life and are wary of taking the blame for another round of wage and price increases. What they want is an increase in real wages, which means the effect of another round of money wage increases on prices must be watched carefully. Some of the more thoughtful labor spokesmen would be glad to settle for a round of price reductions.

In the basic industries, the fourth round wage issue will not reach a climax until late spring or early summer when present steel, auto, coal and electrical contracts can be reopened for wage negotiations. Steel contracts can be reopened in July, rubber after April 14, auto contracts in May, June and July, and coal in June.

Henry Ford II recently gave impetus to fourth round wage talk by stating such increases are "probably inevitable," adding that this would also mean another round of price increases.

Drive Against Reds—Both the CIO and the AFL moved strongly to drive out the communist elements in their unions. CIO President Murray bitterly denounced the reds in a speech at Portland and was wildly cheered by a large majority of the CIO delegates. The CIO lifted the charter of the communist-dominated Greater New York City CIO Council.

Similar condemnation of the communists by speakers at the AFL convention received almost as much applause as attacks on the Taft-Hartley Act.

Soft Spots Appearing

Wolman tells Congress of American Industry economic situation contains weaknesses

SOFT spots are showing up in the nation's economy and the business situation is at a critical stage, Dr. Leo Wolman, professor of economics, Columbia University, warned in New York City last week. The current economic situation contains many weaknesses and national policies, "which aim to perpetuate the existing inflation are more likely to intensify these weaknesses than to dissolve them."

He expressed particular concern over the fact an increasing proportion of the population is finding its incomes unequal to the demands put upon them; also that conditions that were favorable to what were once called buyers' strikes now exist in abundance. Further, costs of doing business are constantly rising, with many companies getting closer to the break-even point, and backlogs are being used up.

Dr. Wolman spoke before the 53rd annual meeting of the Congress of American Industry, held in the Waldorf-Astoria Hotel, Dec. 1-3, and attended by more than 3000 industrial executives from every section of the country. The meeting was sponsored by the National Association of Manufacturers.

Extensive Program—The program consisted of discussions, panels and group sessions, during which manufacturers analyzed inflation and tax problems, foreign aid program, labor relations, national security, international relations and various other issues.

The trend toward increased government controls over the economy will "go down in history as one of the great illusions," but nevertheless it has its immediate dangers, Joseph Morrell Dodge, president, The Detroit Bank, Detroit, said.

"At present we are deep in political uncertainty," he continued. "All the normal risks and problems of business and investment are multiplied by it. Coupled with obstacles and difficulties already created the present outlook is not an encouraging one." However, there is no limit, he believed, as to what the country can accomplish if the "traditional sources of our accomplishments are not smothered by confusion, restrictions, taxation and inflation."

Buyers Expect December Slip

THE election had little effect on November industrial business, according to the monthly report of the Business Survey Committee of the National Association of Purchasing Agents. The report shows production continued high with back orders declining, and the consensus of purchasers was that production would fall during December, and, possibly, in January, with back orders still declining.

Normal seasonal influences are adversely affecting sales and production in some lines for the first time since the war, the purchasers state. Uncertainty of government policies also is a limiting factor on programs. Luxury lines, wearing apparel, and capital equipment appear most affected. Long-range plans involving construction, capital equipment expenditures and sales promotional campaigns appear hesitant.

Prices Level off — Prices appear leveling off except for the nonferrous metals, the buyers report. Many commodities are said to be selling below their postwar highs and keen competition is developing in fabricated items. Overstocked shelf goods are being offered at reductions.

Buyers are tending to reduce inventories to the lowest workable limits.

Industrial Output at New High

INDUSTRIAL production rolled to a new peacetime record in October at 95 per cent above—or nearly double—the 1935-39 average, the Federal Reserve Board reported last week.

The previous peacetime high was reached last February when production was 94 per cent above the average. A 4 per cent rise in steel mill activity to a rate close to 100 per cent of capacity, high auto production and manufactured goods output which doubled prewar figures helped boost the October rate.

Although most business activity soared, the board noted some dark spots in the picture. Output of copper and railroad freight cars declined. Value of department store sales showed less than the usual seasonal rise in October.

General Price Collapse Remote

RECENT price declines are unlikely to snowball into a general price collapse which could lead to a depression, according to Ewan Clague,

commissioner of the Bureau of Labor Statistics, who spoke last week before a meeting of the Eastern Association of College and University Business Officers.

He declared that several economic factors are now operating which didn't exist in the corresponding period after World War I.

"In 1920," he pointed out, "we abruptly stopped our lending to Europe and therefore sharply curtailed our exports at a critical time. Second, in 1920 we virtually stopped our military appropriations. Third, there was a smaller backlog of accumulated demand and of buying power, for the war was shorter, and finally, we had no kind of supports for farm prices."

High 1949 Employment Seen

EMPLOYMENT in the United States will remain high well into 1949, the Federal Security Agency has predicted.

The agency said demand for labor by defense, export, steel and other industries will more than offset declines in shoe, textile, furniture and other fields where output is catching up with demand. October employment was 60,134,000, about a million above the 1947 month, and unemployment is now only 2.7 per cent of the labor force. In normal times an unemployment figure of 3 per cent is considered rockbottom.

Advocates Curb on Price Boosts

LEGISLATION requiring producers of basic materials to observe a 60 to 90-day "cooling-off" period before putting a price boost into effect has been prepared by Sen. Joseph C. O'Mahoney (D., Wyo.), prospective new chairman of the Senate-House Economic Committee, and is intended to cover industries where 30 or more per cent of output is produced by five or fewer firms.

During this period producers would have to go before the Federal Trade Commission and justify their price increases in open hearings. Whether or not the senator pushes this proposal in the 81st Congress depends on what the President proposes in his State of the Union and economic messages to Congress.

Submits Three Military Budgets

SECRETARY of Defense Forrestal has submitted three proposed military budgets ranging from $14.4 to $23 billion to the Budget Bureau for the next fiscal year. President Truman is expected to make a decision shortly by accepting one of these three proposals or combinations thereof in the light of international developments and the domestic situation.

Steel Exports Decline

Total for first three quarters 1.5 million tons below corresponding period last year

EXPORTS of iron and steel during the first three quarters of this year were more than 1.5 million tons below those for the corresponding period of 1947, according to the Commerce Department. The decline which started the first of the year continues, with not only decreases reported each month in respect to the corresponding month in 1947 but with monthly overseas shipments continually decreasing below the level of the preceding month.

September exports were 291,764 tons; August, 308,484 tons; July, 320,190 tons and June, 341,730 tons. Shipments in September, 1947, were 525,010 tons, 80 per cent higher than the total for September of this year.

Overseas shipments, although generally below the three-quarter total for 1947, have increased for a few items. Leading the list in total tonnage is tin plate and tagger's tin with shipments more than 40,000 tons higher than in the first three-quarters of 1947. Next on the list in tonnage is seamless casing and oil line pipe which is grouped with welded casing and oil line pipe and has made the largest tonnage increase, more than 70,000 tons, over the corresponding period last year. Also showing an increase in shipments for the first nine months of 1948 over same period in 1947 are bolts, nuts, rivets and washers.

Export Controls To Be Sought

IN ASKING Congress to extend export controls beyond the present Feb. 28, 1949, expiration date, according to administration sources, President Truman will recommend extension through 1952—which would extend the controls for the period covered by the Marshall Plan.

U.S. EXPORTS OF IRON AND STEEL

(Net Tons)

	September	Nine Months Total—1948	Nine Months Total—1947
Semifinished and Finished Products:			
Ingots, blooms, billets, slabs, sheet bars	16,499	186,494	356,634
Wire rods	2,398	31,318	47,620
Skelp	4,160	43,090	52,616
Iron bars	42	3,147	31,998
Concrete reinforcement bars	6,645	101,215	194,003
Steel bars, cold finished	3,288	35,769	78,180
Other steel bars (excluding alloy)	15,482	232,892	414,779
Alloy steel bars	3,855	47,006	164,721
Welding rods, electric	925	11,921	10,444
Boiler plate	1,565	25,359	28,349
Other plates, not fab.	23,690	257,552	427,220
Plates, fab., punched or shaped	1,355	19,340	26,787
Iron sheets, black	1,254	12,999	23,480
Steel sheets, black	27,843	309,014	431,943
Galvanized sheets	5,119	45,583	59,808
Strip steel, cold rolled	4,444	42,396	67,783
Strip steel, hot rolled	5,153	52,867	80,738
Tin plate and tagger's tin	41,974	454,617	414,287
Terne plate (incl. long ternes)	424	6,782	9,021
Structural shapes, plain	28,704	355,196	560,634
Structural shapes, fab.			
Frame and sashes	3,211	31,760	27,151
Sheet piling			
Rails, 60 lbs. per yard and over			
Rails, less than 60 lbs. per yard	21,453	236,190	357,338
Rails, relaying			
Splice bars and tie plates			
Frogs and switches	3,775	58,702	116,020
Railroad spikes			
Railroad bolts, nuts, and washers			
Car wheels, tires and axles	4,051	31,258	68,805
Seamless black pipe	1,188	15,407	13,149
Seamless casing and oil line pipe	23,545	301,429	230,998
Seamless boiler tubes	3,019	30,550	49,617
Welded black pipe	4,348	46,227	74,410
Welded galvanized pipe	2,467	30,061	54,536
Welded casing and oil line pipe	*	*	*
Welded boiler tubes	*	*	*
Other pipe and fittings	5,208	52,316	74,547
Plain wire	4,958	54,436	60,034
Galvanized wire	3,803	37,280	72,614
Barbed wire	3,000	29,695	55,626
Woven wire fencing	716	7,801	9,195
Woven wire screen cloth	472	4,246	4,471
Wire rope and strand	1,081	9,967	26,165
Wire nails	1,478	14,805	18,580
Other wire and manufactures	3,157	33,811	36,800
Horseshoe nails			
Tacks	780	11,562	10,900
Other nails, incl. staples			
Bolts, nuts, rivets and washers, except railroad	3,154	44,361	33,680
Forgings	2,054	20,952	25,168
Horseshoes	27	473	859
TOTAL	291,764	3,377,846	4,901,708

* Included with seamless.
Source: United States Department of Commerce.

Discuss Power Shortage

Mandatory curtailment seen in Pacific Northwest if voluntary conservation measures fail

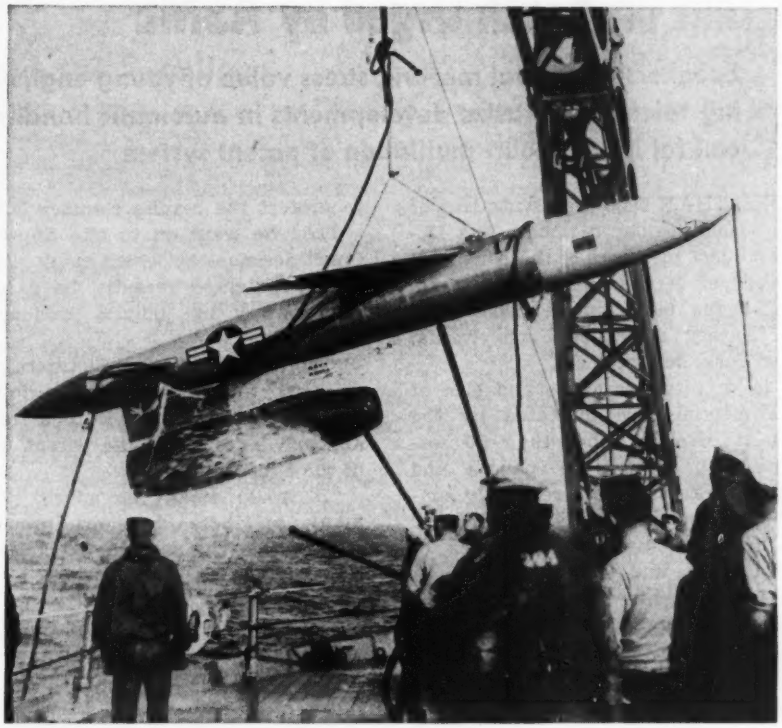
SHOULD the present voluntary conservation of power fail to produce results in the Pacific Northwest, mandatory curtailment will probably ensue. This was the gist of proceedings of a recent two-day conference held in Seattle by the State Department of Public Utilities.

While publicly and privately owned power plants in the area, including British Columbia, are members of a pool, their combined resources are insufficient to meet present demand. Estimates of the shortage this winter varied from 145,000 kilowatts during peak hours in January to up to 396,000 kw. Studies show the situation will be increasingly critical with a shortage of 729,000 kw estimated for 1951 under adverse water conditions.

Not Effective — Other testimony stated that voluntary brown-outs normally are not effective for more than three or four months and that savings do not exceed 6 per cent; that Bonneville Power Administration is now turning every wheel with each generator operating at an overload, above rated capacity; that BPA has turned away aluminum business exceeding 200,000 kw during this year; that the potential power shortage in the area is the greatest in the nation and involves an important aspect of national security.

During the hearings, the Department of Public Utilities was told: That year-round daylight saving would not materially reduce the load in the power pool; that a reduction in frequency, such as California resorted to, might black out the entire west coast of Washington State; that publicly owned utilities, outside the state's jurisdiction, will impose on themselves any restrictions the department may apply to privately-owned companies.

Impair Operations — It was testified that reduction in frequency would impair operations of the atomic energy plant at Hanford, would hamper the manufacture of paper and impose hardships on other industries. Consensus was that the federal government should speed construction of additional power facilities in the area.



PILOTLESS AIRCRAFT: Controlled flights of more than 10 minutes have been made by this almost wingless missile, designated PTV-N-2a (propulsion test vehicle), powered by a ram-jet engine. Missile is shown being recovered from the ocean after a test by the Navy at Point Mugu, Calif., to determine performance information of the ram-jet. The missile is an all-metal high-winged monoplane, 22 feet long, with a wing span of 10 feet. Gross weight is 1600 pounds, 700 pounds of which is ordinary 80-octane gasoline

Sees West Dominated by East

U. S. STEEL Corp.'s postwar expansion into the western steel industry is analyzed in the current issue of the *Stanford Law Review*, published at Stanford University.

The article concludes that when U. S. Steel purchased the Geneva steel plant from the government, the West lost its opportunity "to declare its industrial independence from dominance by eastern firms."

The law review points out that when the Geneva mill was built in wartime, and subsequently was put up for sale as a surplus war property, western businessmen were presented with a chance to develop a mature steel industry of their own "and with it a mature industrial economy".

Westerners Failed — "Westerners hoped," the article says, "that the Geneva plant would be acquired by an independent western company after the war. Such an acquisition would be a long step toward freeing the West from the industrial dominance of eastern firms."

The reason why westerners failed to take advantage of their opportunity, the law review believes, is the tremendous capital needed to develop a western steel industry.

It points out that the funds needed for such development were available from only three sources: the U. S. government, one of the large steel companies, or Bank of America.

"Western businessmen were unwilling to assemble and risk the necessary capital," the article says.

In commenting on U. S. Steel's acquisition of Consolidated Steel Corp., the law review says:

"U. S. Steel risked over $100 million to bring to the West a much needed steel industry, a risk westerners were unwilling to take. U. S. Steel sought Consolidated Steel Corp. in order to acquire an assured outlet for its western steel production."

Surveys California Ore Mines

SURVEY by the California Division of Mines shows that California has more than 100 iron deposits located in 31 of its 58 counties. Of these, 13 are commercially more feasible than the others, and from these 13, the department believes, will come most of the future production of California's iron ores.

Total reserves of all iron ore in California are estimated at 122,658,000 long tons. A third of the state's supply is in Eagle Mountain.

Accent on Youth Urged by ASME

Speakers at annual meeting stress value of young engineering talent, emphasize developments in automatic handling, call for halt in court mutilation of patent system

MORE THAN 5000 representatives of the 26,000 regular members and 15,000 student members of the American Society of Mechanical Engineers attended the 69th annual meeting of the society at Hotel Pennsylvania, New York, last week.

The tremendous scope and size of this meeting are indicated by the fact it involved more than 90 sessions, 343 authors of papers and subjects ranging from relatively simple machining processes to higher mathematics in thermodynamics of gas turbines and jet propulsion.

Several speakers put accent on the value of young engineering talent in today's rapidly developing industrial picture.

L. A. Appley, president, American Management Association, said: "With American management and its conduct of free enterprise on trial at the bar of public opinion, survival of the system depends on management—particularly on management's ability to select and train its own successors.

Standards Difficult To Maintain—"Seven years of full employment at rising real wages have set a standard of performance that will not be easy to maintain. The opportunities which we open up to young engineers in industry today largely will determine the status of industry tomorrow. It is nothing short of criminal to permit a young graduate engineer—with the investment, training, development and potential he represents—to shift for himself without planned guidance and help, in the hope that he will absorb or inhale what he needs to know about assigned work."

In a hard hitting speech before the Machine Design Division, Col. Harry A. Toulmin Jr., well-known patent attorney and industrialist of Dayton, O., lashed out at reformation of patent laws by judicial rather than legislative processes.

"It is axiomatic," declared Colonel Toulmin, "that the patent system of the United States—designed to protect the fruits of the engineering, scientific and inventive brains of our country—has been one of the corner stones of our industrial success. The statistical record proves that the industrial prosperity of any nation is indisputedly connected with the extent to which patent rewards are granted to stimulate invention and to protect the results commercially."

Then he went on to cite Supreme Court decisions by which many rights of the patentee recently have been taken away by judicial pronouncement.

"Engineers and manufacturers will do well to ponder most seriously these sweeping changes in their rights and privileges under the patent laws of the United States.

"It would seem," he added, "that many of these decisions properly were within the province of congressional legislation and not judicial determination."

Production Machining Problems—Among those who dealt with production and machining problems during this meeting were N. L. Bean, director of production engineering, Highland Park Division, Ford Motor Co., Detroit, J. B. Armitage, vice president, and A. O. Schmidt, research engineer, Kearney & Trecker Corp., Milwaukee, and F. W. Boulger, H. L. Shaw, and H. E. Johnson, Battelle Memorial Institute, Columbus, O.

Mr. Bean outlined the work of a new division at Ford's plant called "Automation." This is devoted to the elimination of the human element from routine loading, unloading, machine operating, work transfer and gaging operations through substitution of mechanical methods. That this has gone far beyond the theoretical stage was attested by Mr. Bean's slides illustrating the production of valve guides under "automation" control from feeding in rough of castings to final ejection of finished and inspected bushings.

JAMES M. TODD

Messrs. Armitage and Schmidt dealt with influence of steel hardness on face milling cutters and showed by a series of photographs the effect of progressive wear on the teeth of tungsten-titanium teeth operating on test pieces of varying degrees of hardness. Among the conclusions are that reduction in cutting speed and use of finer feed increases tool life on hard steels, and that heating the work to 1500° F decreases the power required.

Battelle Report—The paper by the Battelle research engineers involved a lengthy description of test results on machinability of free-cutting steels made in a special constant pressure lathe. This important project, sponsored by Carnegie-Illinois Steel Corp., has resulted in a mass of data of great value in production machine shop practice.

During the meeting, the society "got on the air" both in radio and television through "America's Town Meeting of the Air" over 252 stations of the ABC Network. The subject was "Are Our Ideals Being Destroyed by the Machine Age?" Speaking for industry and engineering as upholding the ideals of mankind were William L. Batt of Philadelphia, and Leonard J. Fletcher of Peoria, both prominent members of ASME.

More than 1500 members and guests attended the honors night dinner on Wednesday, Dec. 1. On that occasion James M. Todd, consulting engineer, New Orleans, was introduced as the 1948-49 president of ASME. Mr. Todd is an authority on air conditioning, power plants, and equipping of large office buildings and factories. He is an engineering graduate of Tulane University.

Officers—Regional vice presidents are—Arthur Robers Jr., chief engineer, Lynchburg Foundry Co., Lynchburg, Va., Forrest Nagler, chief mechanical engineer, Allis-Chalmers Mfg. Co., Milwaukee, Carl J. Eckhardt, professor of mechanical engineering, University of Texas, Austin, and Albert R. Mumford, development engineer, Combustion Engineering Co., New York.

Directors-at-large are: Jacob A. Keeth, manager of power production, Kansas State Power & Light Co., Kansas City, and Ralph A. Sherman, assistant director, Battelle Memorial Institute, Columbus, O.

The ASME medal, highest honor of the society, was awarded to Dr. Fred-

erick G. Keyes, head of the department of chemistry, Massachusetts Institute of Technology, "for his many fundamental contributions to the advancement of mechanical engineering."

Power Developments Spotlighted

IMPROVED delivery situation on heavy electric power equipment was reported by at least one producer of such equipment, while makers of lighter lines indicated a decided easing of output and delivery difficulties as the 18th National Power Show convened last week at New York's Grand Central Palace.

A spokesman for one company said steam turbines could now be supplied by his firm in a period of between two and three years, and generators in a still shorter period. A maker of smaller generators, said its turbogenerators of up to 12,500 kw capacity could now be delivered in from six months to a year.

Heavy order backlogs, however, remained the general rule with the more than 400 exhibitors.

Heating Men Meet in Cleveland

SIX HUNDRED manufacturing, wholesaling and retail-contracting representatives of the warm air heating industry will attend the 35th annual convention of the National Warm Air Heating & Air Conditioning Association at Hotel Cleveland, Cleveland, Dec. 9 and 10.

Headline speaker at the gathering will be Lowell B. Mason, member of the Federal Trade Commission.

Science Group To Meet in 1949

AMERICAN Association for the Advancement of Science, Washington, will hold its next meeting Dec. 26-31, 1949, in New York City.

Notations in recent issues of STEEL in the Calendar section have incorrectly stated this meeting was scheduled for December, 1948.

Reports on Scrap Usage

CONSUMPTION of iron and steel scrap totaled 4,740,000 gross tons in August, according to a Bureau of Mines report issued last week. Comprising the total were 2,416,000 tons of purchased scrap and 2,324,000 tons of home scrap.

Scrap used in steelmaking furnaces during the month totaled 3,462,000 tons, while pig iron consumed in them amounted to 4,059,000 tons. Thus, of the total melt in steelmaking furnaces 46 per cent was scrap and 54 per cent was pig iron.

Gray iron foundries used 850,000 tons of scrap and 402,000 tons of pig iron in August.

Consumers' stocks at the end of August consisted of 3,561,000 tons of purchased scrap and 1,251,000 tons of home scrap, making a total of 4,812,000 tons. Consumers' and suppliers' stocks of pig iron at the end of the month aggregated 815,000 tons.

Culvert Pipe Firms Sued

REPUBLIC STEEL Corp. and the Toncan Culvert Manufacturers' Association, Cleveland, and 19 fabricators of culvert pipe are charged in a government civil antitrust complaint with restraining competition in manufacture and sale of corrugated sheet metal and culvert pipe.

The complaint charges Republic and 19 other fabricators of metal culvert pipe have allocated territories for making and selling this pipe, with Republic reserving exclusive right to make and sell this pipe in Ohio, West Virginia, Pennsylvania, New Jersey, Delaware, Maryland, the District of Columbia, and in all foreign countries.

Each of the 19 other fabricators, the complaint states, has been allotted the exclusive right to make and sell the pipe in carefully-defined geographical areas throughout the United States and each of the 19 agrees to buy only Republic sheet metal.

The Toncan Culvert Manufacturers' Association, the complaint charges, aided in enforcement of restrictions on manufacture and sale of metal culvert pipe and participated in establishing quotas of sheet metal used by Republic in allocating this product.

The government asks: 1. Cancellation of the allocation agreements; 2. Dissolution of the association; and 3. Enjoining of Republic from buying out fabricators of culvert pipe or from requiring any of them to deal exclusively with Republic or to refrain from selling pipe except in a prescribed territory.

Republic replied that the sales practices complained of by the government have been standard in the culvert industry for nearly half a century. "The sales contracts which were in existence between Republic and various culvert fabricating customers to which the government takes exception have all heretofore been canceled," the company said.

Face New Price Complaint

NEW COMPLAINT of price discrimination has been filed by the Federal Trade Commission against General Motors Corp., Detroit, and its subsidiary, AC Spark Plug Co., Flint, Mich. Simultaneously the FTC dismissed similar action started in 1939.

The old proceedings, said the FTC, were delayed because of the war, and re-examination of the case showed its charges with respect to current acts should be stated in a new complaint.

Charging price discrimination in the sale of spark plugs, oil filters, fuel pumps and other automobile parts and accessories, the FTC says such discrimination is brought about by: 1. Granting different prices to different types of accounts; 2. Payment of rebates to certain distributors; 3. Selling products on condition that purchasers will not handle products of a competitor; and 4. Fixing retail sale price of AC products in restraint of trade.

Simpson Heads Harrisburg Steel

JOSEPH T. Simpson has been elected president of the Harrisburg Steel Corp., Harrisburg, Pa., to succeed Wilbert Wear who has resigned after serving 15 years as head of the company. Mr. Simpson joined Harrisburg 25 years ago and earlier this year had been named vice president. Mr. Wear will continue with the company in a consulting capacity.

Calendar of Meetings . . .

Dec. 6, Pressed Metal Institute: Toledo district meeting, Hotel Secor, Toledo, O. Institute headquarters are at 829 Union Commerce Bldg., Cleveland.

Dec. 6-8, American Institute of Electrical Engineers: Conference on electric welding, Rackham Memorial Bldg., Detroit. Institute headquarters are at 33 W. 39th St., New York.

Dec. 6-10, Machine Tool, Metal Working & Welding Equipment Show: Sponsored by Austin-Hastings Co. Inc., at Hartford Times Radio Center Bldg., Hartford, Conn.

Dec. 7-8, Diesel Engine Manufacturers Association: Meeting at Union League Club, Chicago. Association headquarters are at 1 N. LaSalle St., Chicago.

Dec. 10-11, Machinery & Allied Products Institute: Fourth conference in capital goods economics, at Hotel Mayflower, Washington. Washington office of the institute is at 910 17th St., NW.

Jan. 4, American Washer & Ironer Manufacturers' Association: Annual meeting, Morrison Hotel, Chicago.

Jan. 10-14, Materials Handling Institute and American Society of Mechanical Engineers: Materials handling show, in Philadelphia. ASME's management and materials handling divisions will conduct a five-day materials handling conference concurrently with the exposition.

Jan. 16-20, Associated Equipment Distributors: 30th annual meeting, Hotel Stevens, Chicago. Group's executive office is at 360 N. Michigan Ave., Chicago.

Jan. 27, Stoker Manufacturers Association: General meeting, LaSalle Hotel, Chicago. Association headquarters are at 307 N. Michigan Ave., Chicago.

Windows of Washington

By E. C. KREUTZBERG *Washington Editor, STEEL*

Democrats radiate confidence reminiscent of Roosevelt era as they plan for 81st Congress. Party leadership plans for future elections with Republicans in confusion

THE FULL measure of the blow which the elections dealt the Republicans is only now becoming apparent. Former Republican leaders for the most part do not know just what to say and are keeping their mouths shut.

Talks with some Republicans who will sit in the next Congress indicate they will follow an every-man-for-himself policy. They will start out in the 81st Congress with far less reliance on party leadership than was the case in the sessions of the 80th Congress. Instead, they will steer their courses on the basis of their understanding as to what is wanted by the voters back home.

The Democrats, on the other hand, radiate a confidence reminiscent of the palmy days of the Roosevelt era. They feel so good they have decided to let bygones be bygones insofar as administration and other leaders who failed to support adequately the party in the November elections. Apparently there are to be no reprisals.

Shaping Campaign — Rather, the party management, as represented by two men, President Truman and Sen. J. Howard McGrath, have already shaped up a campaign aimed at winning future elections. Secretary of Labor Tobin is working with labor leaders in writing the Taft-Hartley repealer message which the President will deliver to Congress. Other activities involve farm leaders, Negro leaders and others who will have a voice in shaping up the President's policies.

The way the wind is blowing was reflected when Secretary of Agriculture Brannan—in Republican Maine of all places—told the farmers on Nov. 13, at the National Grange convention, that they need to be vigilant to protect farm-aid programs from "powerful forces that would destroy them." The theme of Secretary Brannan's address was the Truman administration's "determination" to preserve "agriculture's gains" under recent Democratic administration by setting up a permanent farm price support program and the creation of enough facilities so farmers can store their grain while awaiting a favorable market.

The Republicans, of course, will come up with something in the way of party policy, but for the present they continue groggy. The outstanding fact is that they have lost their confidence in the old leadership, and they do not yet know to whom or where to turn.

Works on Anti-inflation Plan

SINCE his recent designation by President Truman as the co-ordinator of the anti-inflation program to be submitted to Congress in January, Dr. Edwin G. Nourse, chairman of the President's Council of Economic Advisers, is holding continuous meetings with cabinet officers and agency administrators concerned with various sectors of the overall economic picture.

In a press conference, Dr. Nourse inferred that the anti-inflation program to be presented in January will not necessarily be the same that has been advocated by the President in November of 1947 and on several occasions in 1948. President Truman, said Dr. Nourse, has not yet determined upon the details of the anti-inflation program he will set forth in his coming state of the union message but is waiting to see "what facts turn up and how they are analyzed by the interested agencies."

He admitted to reporters that there have been significant developments of late of an anti-inflationary character but said that "one swallow does not make a summer."

Propose Further Loan Curbs

NOW under study by the White House strategy staff is a proposed request to Congress for authority to curb bank loans much more drastically than at present as an anti-inflation measure. Backed by the Federal Reserve System Board of Governors, the use of bank credit for expansion, to build up inventories, to purchase capital equipment, etc., would be subject to whatever restriction might be considered desirable from time to time. The proposal, therefore, is of wide interest to industry, particularly because it would apply not only to bank loans but to loans by insurance companies and other lending institutions.

It is by no means certain that President Truman will ask for this authority; there has been opposition elsewhere in the administration, notably by Secretary of the Treasury Snyder, to ideas of this type. If he does ask it, however, the chances are that Congress will grant the power. The House and Senate Banking and Currency committees, as they will be reorganized in the light of the election results, are expected to follow the White House line. Jesse P. Wolcott (Rep., Mich.), who, as chairman of the House committee, was a major stumbling block to the administration in the 80th Congress, will not only descend to the level of ranking minority member, but most of the conservatives who supported him in opposing demands for controls failed to be re-elected in the November contest.

Marshall Plan in Reverse

FIVE European countries — France, Italy, Trieste, the United Kingdom and Greece—have begun to plow back so-called "counterpart funds" into their economies. The effect is to accelerate the progress that is being made under the Marshall Plan to rehabilitate the western European economy.

To understand what is meant by "counterpart funds," it must be recalled that all goods paid for by the Economic Cooperation Administration in dollars are paid for, in turn, by the governments or business firms which get the goods. They are paid for in local currency which, under the terms of the ECA agreements with the participating countries, are to be used in furthering the economic assistance programs. The effect substantially is to multiply by two the dollars we are siphoning into European rehabilitation.

Under this arrangement, Marshall Plan aid often works in reverse; it is not always a one-way movement. The most notable example to date of aid furnished to the United States was the transfer of 1000 tons of high-grade natural rubber by the British to the United States stockpile; the rubber was paid for by the British from counterpart funds.

As of Nov. 1, local currencies deposited in the counterpart funds of the participating nations came to approximately the equivalent of $1,412,000,000; as of Nov. 1, $678,000,000 had been released into projects

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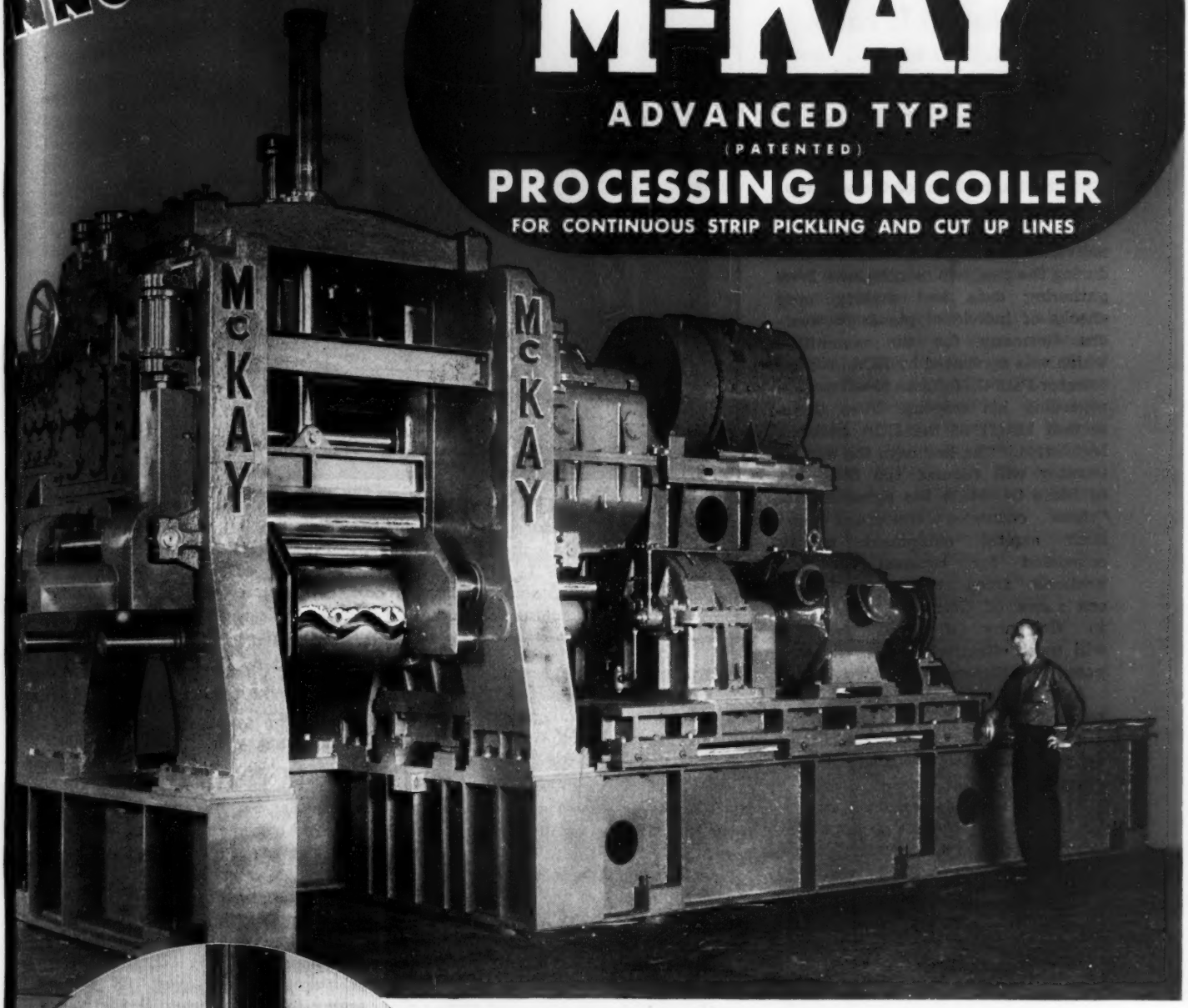
McKAY

ADVANCED TYPE

(PATENTED)

PROCESSING UNCOILER

FOR CONTINUOUS STRIP PICKLING AND CUT UP LINES



New Features:

1. Rugged, rolling mill design.
2. New expanding mandrel with variable drag motor — accurately centers coil and provides controlled strip tension.
3. Traveling cradle car, for preparing and loading coils.
4. Additional automatic devices reduce loading time.
5. Two (2) separate, pressure regulated, processing roll units, permit better processing and more efficient scale breaking.
6. Larger diameter pulling rolls utilize controlled pressure.
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8. Full hydraulic operation, with finger tip control.
9. Improved method of lubrication.
10. Compact design — minimizes floor space requirements.

The **McKAY MACHINE** *Company*

ENGINEERS AND MANUFACTURERS OF SHEET, TIN, AND STRIP MILL EQUIPMENT

YOUNGSTOWN, OHIO

ASSOCIATED COMPANY The WEAN ENGINEERING CO. Inc. - WARREN, OHIO

aimed at strengthening the nation's economic health.

Humphrey Returns To Europe

GEORGE M. HUMPHREY, chairman, Economic Cooperation Administration's Industrial Advisory Committee, is returning to Europe where he will be joined by other members of the committee for the purpose of studying the problem of German reparations.

The committee plans to confer with individual engineers and experts who during the past two months have been gathering data and making spot checks of individual plants in western Germany for the committee which was appointed by ECA Administrator Paul G. Hoffman to advise him regarding his responsibilities under section 115(f) of the ECA enabling legislation. The law says the administrator will request the Secretary of State to obtain the agreement of "those countries concerned that such capital equipment as is scheduled for removal as reparations from the three western zones of Germany be retained in Germany if such retention will most effectively serve the purposes of European recovery."

A month ago, agreement was reached with the British and French governments that, subject to whatever deletions from the reparations program may be agreed to, as a result of the Humphrey committee's review, the balance of the reparations program be brought to a speedy conclusion.

WAA Prepares To Close Shop

IN PREPARING to go out of business Feb. 28, 1949, the War Assets Administration has sent out 30-day layoff notices to another 4000 employees, with another slash due Jan. 1 and the final one Feb. 1. At one time WAA had as many as 60,000 employees.

Expectations are that approximately 5000 will be shifted over to the agencies that will mop up on the job of disposing of government-owned surplus property after Feb. 28. Under the statute, disposal of plants and real property will pass to the Reconstruction Finance Corp., of personal property to the Bureau of Federal Supply, and of aviation items to the Air Force.

Heads Farm Machinery Division

WILLIAM J. FISHER, president, A. B. Farquhar Co., York, Pa., will direct the mobilization planning activities of the agricultural machinery and implement division of the National Security Resources Board. Arthur U. Sufrin, Philadelphia, will be deputy director of the division, which is one of 30 industry divisions of the board's Office of Production.

Mr. Fisher served as a member of the farm machinery industry advisory committee of the War Production Board during World War II. He is now a member of the executive committee of the Farm Machinery Institute, and also of the advisory committee on farm equipment of the Department of Commerce.

Mr. Sufrin, a resident of Philadelphia for the past 30 years, was assistant director of the farm machinery and equipment division of the WPB during World War II.

He has recently been serving as consultant for the Economic Cooperation Administration on farm machinery matters.

STANDARDIZE SCREW THREADS: Representatives of the United States, Britain and Canada sign agreement providing that all three will adopt standardized screw threads (STEEL, Nov. 29, p. 32). Signing the pact are, left to right: T. R. B. Sanders, United Kingdom; Dr. Edward U. Condon, United States; William L. Batt, chairman of the group; and C. D. Howe, minister of trade and commerce, Canada. NEA photo

Blast Furnace Slag Use Grows

THE BLAST furnace slag industry, which has become an important offshoot of the iron and steel industry, now is dignified by a new publication, "The Slag Runner." Published by the National Slag Association, Earle Bldg., Washington 4, D. C., the first number contained three pages devoted to the program of the association's recent convention at the Wardman Park Hotel, Washington. Forthcoming monthly issues will be devoted to economic and technical phases of the slag industry.

The industry, according to a recent report of the Bureau of Mines, now consists of 38 companies operating 58 plants that prepare iron blast-furnace slag for commercial uses. The 1947 sale of iron blast-furnace slag reached a new high of 19,581,679 short tons valued at $19,525,482, the latter figure being 17 per cent above the 1946 mark. But that represents achievement of only about two-thirds of the industry's goal. It now is trying to develop uses for the rest of the slag production—which means it is trying to find outlets for another 10 million to 12 million tons.

This goal may be reached, the industry hopes, through three approaches now in process of development. One is the greater use of lightweight slag in concrete aggregate. Lightweight slag is produced by adding a controlled amount of water to the molten slag, resulting in an expanded, strong structure. Consumption of lightweight slag was 1,130,636 short tons in 1947, a 46 per cent gain over 1946. A second growing outlet is in the field of agriculture, slag being used instead of lime as a soil conditioner; the industry supports three fellowships in this field of research. Finally, the glass industry has become interested in slag as a raw material.

Political or Business Stability First?

France has the opportunity to find out; answer is obscured in Belgium and Britain since stable governments and improving output have paralleled for some time

THIS question is being asked by European industry: Which comes first, political or industrial and economic stability?

An answer may be found in France where a reasonable facsimile of political stability appears a possibility, with the government of Robert Schuman slowly strengthening its hand. In Belgium and Britain, the answer is obscured by the fact that stable governments and steadily improving production rates have paralleled one another for some time.

France

FRENCH politically inspired strikes are subsiding, at least temporarily; ECA funds are bolstering the government's position; control of Ruhr coal and steel industries, hot domestic issue over which the Schuman ministry could have stumbled, appears nearer settlement by France's acceptance of the British and American invitation to participate on a control board to supervise these businesses.

These developments give promise for greater political stability and put the burden of proof on industry which long has maintained that maximum production could be achieved only when the government was fairly strong.

ECA funds totaling 25 billion francs were authorized during October. This sum has been divided as follows: 9570 million francs for collieries, 6200 million for railroads, 2180 million for electrical and gas development in Algeria, 50 million for development of coal fields in the Southern Oran district, 2 billion for the Agricultural Credit National Bank, 5 billion for research and ore and oil prospecting in the French Empire and in France.

Latest iron and steel prices are 16 per cent over January quotations. The new prices are as follows, per metric ton: Billets $56.90, beams $70.53, merchant bars $78.52, rails $83.13, plates over 5 mm thick $98.97, plates 2 mm to 5 mm thick $100.53, sheets $114.-70, tin plate $244.47, hematite pig iron $56.78.

Belgium, Luxemburg

OUTPUT of steel ingots and castings in Belgium during September was 352,620 metric tons, against 351,690 tons in August; 47 blast furnaces were in operation. In Luxemburg, steel production was 223,309 tons during the month, compared with 217,616 tons in August; 23 blast furnaces were in operation, one more than in the preceding month.

In the home market, order books are well filled and deliveries are still improving. Some firms can now supply sheets in from four to six weeks.

The export market continues to be favorable. Belgium is negotiating with Britain for the sale of 400,000 tons of steel to that nation; an additional 60,000 tons will be supplied to Norway. Numerous sales of sheets and pig iron to United States buyers are still reported, but the price differential is slowing up this trade. One large Belgian shipbuilder, Societe John Cockerill, has received an order from the United States for three 16,-500-ton tankers. These units will be built completely in the various Cockerill yards. The engines will be steam turbines of Parsons-Cockerill design. Steam will be raised in two Babcock & Wilcox boilers for each ship.

Great Britain

STEADILY improving steel production in Great Britain may bring about some modification in the present rigid allocation system. A few of the smaller consumers may soon be able to buy on the open market the steel they require to meet normal needs.

Stringent supplies, however, will keep all the heavy users, like the auto and shipbuilding industries, in the allocations fold.

Despite the issue of steel nationalization, the various large expansion programs, particularly by the Steel Co. of Wales Ltd. at Port Talbot, are going ahead on schedule. A $1,200,-000 contract for furnaces at this installation's continuous wide strip mills has been awarded to Incandescent Heat Co. Ltd. The furnaces have a combined capacity of 7000 tons a week. Each of the several units will bright-anneal 250 tons of steel strip per charge in coil or flat form. This strip is rolled 100 tons an hour.

CHURCH OF METAL: To hasten work of building morale of Japanese people, metal churches that can be erected quickly are being utilized. This one fabricated by Steelcraft Mfg. Co., Rossmoyne, O., is one of 67 metal buildings delivered to Japan by the company. Some of the buildings are for schools, others for homes for missionaries. Company shipped not only prefabricated sections of the buildings but also complete lighting and plumbing equipment and instructions for assembly

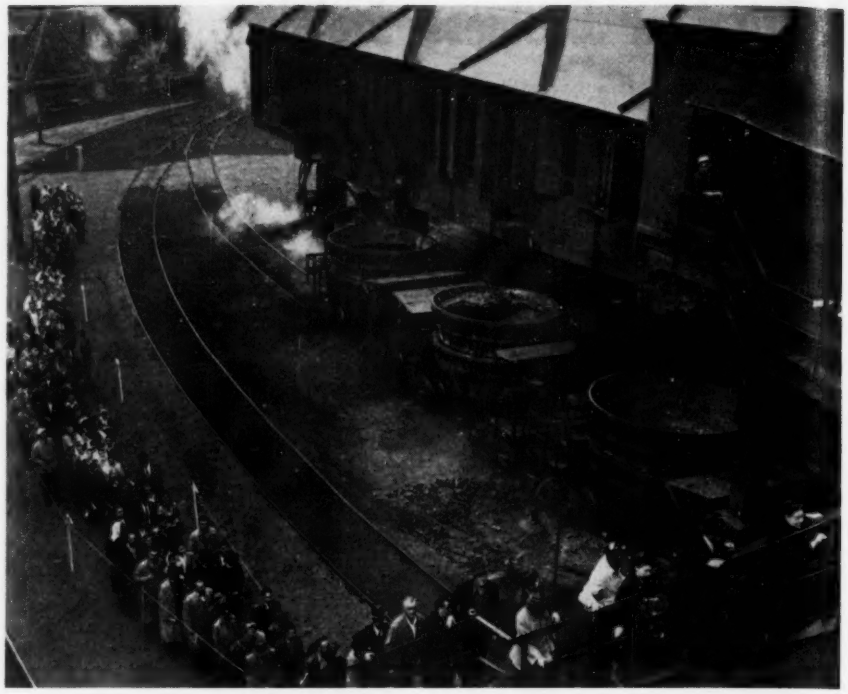
Canadian Open House

Three Dominion steel firms, Algoma, Stelco and Atlas, are hosts to 50,000

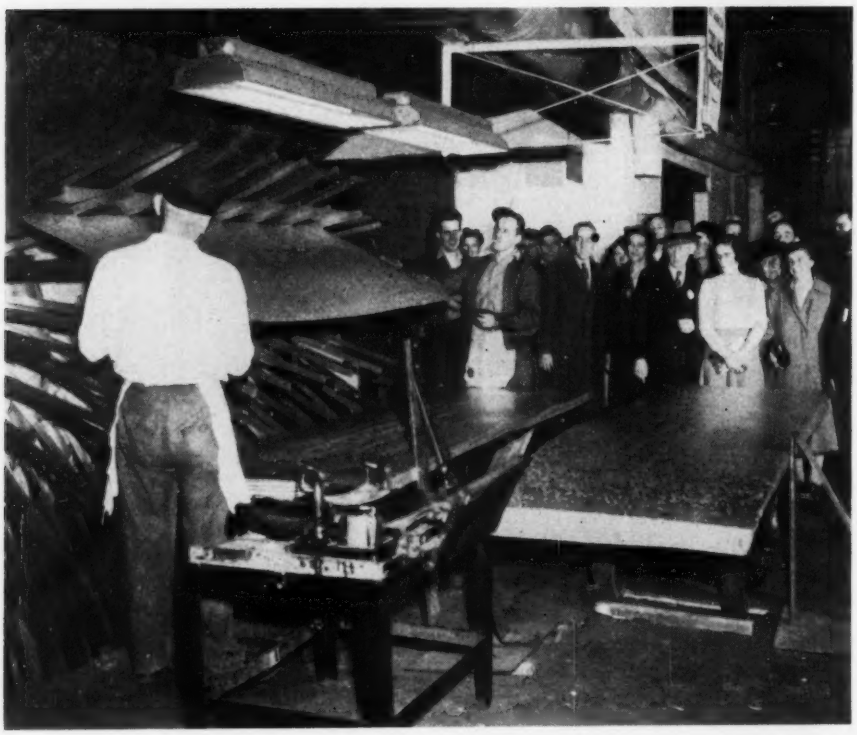
MORE than 50,000 Canadians in Ontario witnessed steelmaking operations in three of the Dominion's largest mills recently. Mills visited account for over two thirds of Canada's total ingot production. The Steel Co. of Canada Ltd. in Hamilton producing 1,100,000 ingot tons, the Algoma Steel Corp. in Sault Ste. Marie with an output of around 1,000,000 tons of ingots and Atlas Steels Ltd., Welland, manufacturing 200,000 ingot tons of special quality alloy steels were the hosts. Public reaction to the steel industry in full operation was one of complete interest and deeper understanding of steel's importance to Canada's economy.

Nearly 14,000 citizens of Sault Ste. Marie and the vicinity were escorted through Algoma Steel's plant. Visitors saw workers make pig iron in one of the commonwealth's largest blast furnaces. They followed the steelmaking cycle through the bessemer converter, the open hearth furnaces, "teeming" or ingot casting, the soaking pits, and all the stages of rolling steel from heavy plate and rails to small merchant sizes.

Guests were further treated to a comprehensive display of products made by Algoma Steel's customers. Familiar items such as a Ford chassis, wrenches, pumps, farm equipment, electrical machinery, railroad parts and many others were evidence of the wide industrial field served.



Part of the 14,000 Soo citizens climbing the stairway to the casting floor of Algoma Steel Corp.'s No. 5 blast furnace, said to be the largest in the British commonwealth. Signs posted outside the range of the camera gave visitors details regarding the operation



Known to steel men as a "porcupine," the cooling rack in Steel Co. of Canada's galvanizing department could easily have become a bottleneck in the tour. Amiable guides, however, kept the crowds moving

Stelco Opens Gates—The Steel Co. of Canada's vast Hamilton Works opened its gates after approximately eight months of careful planning. During the open house, 25,614 Stelco workers, their families and Hamilton friends crowded through the plant.

The national spotlight shown on Stelco for it was featured not only by the press and radio, but newsreel services also. Interviews with visitors from all economic levels revealed an overwhelming appreciation of Stelco's gesture. With the possible exception of a few employees, only a handful of people had seen all the details in the production of steel prior to their visit.

Stelco, being one of the most completely integrated steel companies in the world, offered several points of interest beyond the usual mill. Workers had their fun, too, as they momentarily stunned guests at the plate mill by heaving extra shovels of salt on the hot slab as it passed through the rolls. The resulting explosions shook the building, but it was all part of the show. Guides posted in the area hastened to put visitors at ease by explaining that the salt was merely to loosen scale and that the louder than usual blasts were for their benefit.

New Strip Mill Shown—Visitors also saw the new cold strip mill which had been in operation only two days. This 56-inch mill will serve the automobile industry and other users

of finely finished sheet steel who up to now have looked to the United States for their supply.

Stelco's exhibit of end-products included only those manufactured in Hamilton. Two large tents housed Hamilton-made products from heavy road machinery to small wrenches and from gimmicks necessary to industry to simple household gadgets.

At the end of the plant tour, guests saw displays which explained the advantages enjoyed by Stelco workers. They learned how Stelco payrolls affect the economy of Hamilton and the ways in which Stelco has served the city and the Dominion as a citizen of the community.

A slide presentation, "38 Years of Service," told the history of Stelco. It explained business ownership, the extent of Stelco's profits and the importance of profits in the Canadian economy.

Welland People Visit Atlas—Atlas Steels Ltd. directed all of its open house publicity to the Welland-Crowland district, where most Atlas workers live.

In its twentieth year of operation, Atlas stressed reasons for its growth from 65 workers to almost 2200 today. Its progress was further emphasized in terms of increased tonnage, additional equipment, expanded payrolls and the parallel growth of Welland. Lacking the more dramatic features of steelmaking like blast furnaces, bessemers and open hearth furnaces where molten steel can be readily seen, Atlas built up interest around its big electric furnaces and steam presses.

Attention was focused on labor, community and industrial relationships, the importance of alloy steels to all industries and the company's global recognition as a producer of high quality steels filling specific needs throughout the world.

Electrical Demand To Hold

PURCHASES of electric motors, generators, adjustable-speed drives and controls by the nation's key industries in 1949 to drive their production machines and power their processing lines will match, and may well exceed, today's high buying level.

This is the consensus of 58 district managers and field sales engineers of Reliance Electric & Engineering Co. who met recently for a sales forum at the company's Cleveland headquarters. Plant expansion projects and equipment modernization programs which many producers of industrial goods and consumer products have either on the drawing board or in the blueprint stage, installation of additional generating capacity by electric utility companies and increased mechanization of operations to offset rising production costs were cited as three of the principal bases of expectations that electrical equipment purchases would continue briskly next year.

Along the Atlantic seaboard, shipbuilders and producers of paper products, textiles and steel strip will be adding new electric drives to present plant equipment or replacing obsolete units with new ones. In the Pittsburgh area, the movement of plants into new locations at Pittsburgh, to get closer to steel supply sources, was seen as a spur to demand for motors, generators and related equipment. Ohio district managers saw continued good markets for electrical motors in the increased emphasis by makers of heavy machine tools on new designs that call for faster operation.

In the Chicago, Detroit and St. Louis areas, foreign reconstruction programs and booming domestic business are accelerating demands for a. c. and d. c. motors and adjustable-speed drives. The South's textile industry is also turning more to adjustable-speed drives. The chemical and petroleum industries in the Southwest and the many new businesses on the West Coast are boosting the demand for all types of electrical equipment.

New Machine Tool Firm Formed

NEWLY formed U. S.-Burke Machine Tool Co. has purchased Burke Machine Tool Co. Burke, formerly located at Conneaut, O., will move its operations to the new company's Cincinnati headquarters.

Burke manufactures bench type milling machines and attachments, and its line will supplement the products of the other U. S.-Burke division, United States Machine Tool Co., which makes hand milling machines and attachments. The present distribution organizations of both Burke and U. S. lines will be maintained.

Principals of the new company are S. Charles Straus, president; John R. Strauss, secretary and treasurer; and R. C. Wigger, vice president.

Develop Spinning Machine

DEVELOPMENT of a continuous process spinning machine for making rayon yarn was announced recently by American Viscose Corp., Wilmington, Del. Company officials claim the newly developed machine is smaller, faster and more efficient than older models.

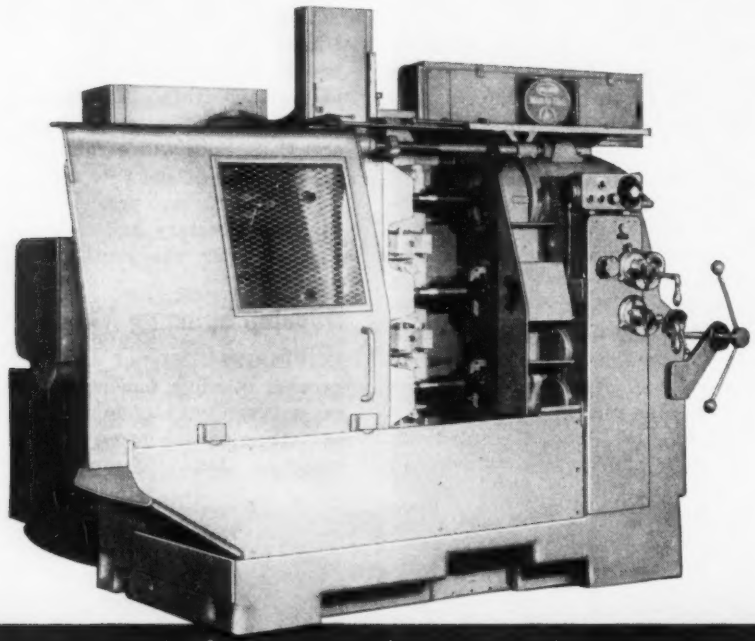
Roll turning shop at Atlas Steels Ltd., a model in color dynamics, was a source of amazement to visitors. Note explanatory sign typical of all departments visited

Exclusively developed by American Viscose, details of the machine will be kept secret because of the delay in getting patents. For the present time, the company will not license other manufacturers to use the machine.

Railroad Has New Diesel Shops

NEW SHOPS for repairing diesel locomotives have been opened at Flat Rock, Mich., by Detroit, Toledo & Ironton Railroad to supplement a nearby steam locomotive roundhouse.

In its modernization program the carrier is using nailable steel flooring in box cars and gondolas. The steel-floored box cars are intended primarily for loading by industries which have experienced difficulties with wood floors due to breaking through of mechanical handling equipment.



Model 30H BULLARD Man-Au-Trol Horizontal Lathe triples production on between-center shaft turning work by machining 3 finished pieces per cycle with its 3 identically tooled spindles. Simplified tooling for rough and finished cuts also reduces tooling costs. Multiple-tool blocks are provided when needed for grooving, recessing, chamfering, angle-turning and other such operations.

Now... YOU CAN GET 3 Finished Pieces IN LESS TIME THAN IS OFTEN REQUIRED For 1

Model 30H Man-Au-Trol Horizontal Lathe Produces 3 Identical Pieces Per Cycle

Reports are now coming in from owners of BULLARD Man-Au-Trol Horizontal Lathes proving that this machine's unique "3 for 1" method really pays off in lower production costs. See the accompanying chart for some actual figures.

WANT ALL THE FACTS?

Here's a Lathe with unique "3 for 1" productivity, right-handed operating convenience, Man-Au-Trol versatility, (manual or automatic operation) and startling performance.

In the interest of lower manufacturing costs, make a study of the Model 30H BULLARD Man-Au-Trol Horizontal Lathe. Write today for booklet and time studies on your work. THE BULLARD COMPANY, Bridgeport 2, Connecticut.

These 8 Production Reports May Suggest Big Savings For YOU

Number	Part	Material	3 Pcs. Floor to Floor Time	Time per Piece
1	Third Motion Shaft	Steel Forging	2.21 min.	44 sec.
2	Overdrive Main Shaft	SAE 4620	1.96 min.	39 sec.
3	Crankshaft	Steel Casting	2.25 min.	45 sec.
4	Sector Shaft	SAE 5132	.8 min.	15 sec.
5	Counter Shaft	SAE 4320	1st chg. 1.78 min. 2nd chg. 1.63 min.	36 sec.—1st chuck 32.6 sec.—2nd chuck
6	Inner Axle Shaft	SAE 4140	1.c2 min.	32 sec.
7	Outer Race Bell	SAE 4620	2.0 min.	40 sec.
8	Rear Axle Shaft	SAE 8630H Forge	2.30 min.	46 sec.

BULLARD CREATES *NEW METHODS* TO MAKE MACHINES DO MORE

BULLARD MAN-AU-TROL
MASTER OF THE MACHINE
HORIZONTAL LATHE
Model 30H

By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Five million cars and trucks produced in United States and Canada in first 11 months. Year's total should approximate 5.5 million, barring December interruptions

DETROIT

FROM some assembly line in the United States or Canada came last Tuesday the 5,000,000th vehicle built by the auto industry this year, according to the statistical experts who keep track of this sort of thing. The milestone was passed virtually unnoticed but it meant that in 11 months of this year there have been built practically the same number of cars and trucks as in 12 months of last year, and December production will be the measure by which this year outstrips last. Barring any unforeseen interruptions in the next few weeks, the year should close pretty near the 5.5 million mark, which is about what the forecasters were predicting last January.

The achievement has its noteworthy aspects, for it was accomplished in the face of repeated interruptions because of materials shortages and frequent insurrections on the part of organized labor, not envisioned a year ago. Tight steel supply forced most manufacturers, from the largest to the smallest, into the "conversion" market with its attendant high costs and complicated follow-up problems. How long it will be necessary to continue the practice is almost anyone's guess. Certainly the excessive costs involved make it one of the first things to be dropped, either when supply of new cars comes more nearly into balance with demand or when sufficient tonnage of mill steel can be acquired.

At present you can get all shades of opinion on the supply-demand picture for new cars. Sales officials are practically unanimous in professing to see 12-18 months of peak business, at least in the lowest-priced volume lines. At the same time more and more reports are coming in of buyers walking into showrooms and driving out with new cars, without ever having had an order placed earlier.

Hearings Disturb Builders

HEARINGS being held by the Macy Committee in Washington on automobile retailing practices are disturbing to manufacturers and there may be some more franchises revoked because of the adverse publicity which has come out of the hearings. Car makers long have taken the position that their dealers are independent business men, many of whom have invested hundreds of thousands of dollars in elaborate showrooms and service facilities. It is difficult to crack down with a franchise cancellation without positive proof of alleged malpractices. About all the manufacturers can do is to recommend certain prices and try to persuade dealers to adhere to them. The urge to turn a fast dollar is not peculiar to automobile dealers and the mere fact that hundreds of buyers have paid premiums to get delivery of new cars shows that the transactions were worth the price.

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

	1948	1947
January	422,236	366,205
February	399,471	393,663
March	519,154	443,588
April	462,323	445,137
May	359,996	404,191
June	454,401	421,466
July	489,736	399,456
August	478,146	364,478
September	437,181	444,501
October	516,843	461,536
November	494,700*	417,493
11 mos.	5,034,000*	4,561,714
December		492,109
12 mos.		5,055,284

* Preliminary.

Estimate for week ended:

	1948	1947
Nov. 13	116,029	110,663
Nov. 20	120,592	115,197
Nov. 27	90,039	84,391
Dec. 4	115,000	110,759

Estimates by Ward's Automotive Reports

New Model Prices Advance

MEANWHILE prices on more new models have been announced, and they continue to inch upward. Olds has set prices on its 76 series up from $45 to $60 over the 1948 styles. However, the series does carry a completely new body design and higher horsepower in its 6-cylinder engine. Increases on the Futuramic 98 series vary from $360 to $370, but only about $100 of this is strictly an increase, the balance covering items which are now standard equipment instead of optional as formerly. The price boost can hardly cover the additional costs involved in tooling and manufacturing the new V-8 high-compression engine which Olds has tradenamed the Rocket engine, after apparently deciding to drop the former Kettering identification.

Production of the 66 and 68 series Oldsmobiles has been discontinued for 1949, but shortly there will be an 88 model which will be the 76 series body plus the V-8 engine. This combination should really be a "hot" design in view of the lighter body and the 135-horsepower engine.

Some observers consider the increases in 1949 Cadillac, Buick and Oldsmobile prices to be on the modest side and there are hints that they were agreed upon only after considerable argument among top GM policymakers, some of whom were holding out for much higher boosts.

Australian Car in Production

START of production of the first Australian-built automobile—the Holden—has been disclosed by General Motors-Holden's Ltd., in two new plants at Fisherman's Bend, Victoria, and at Woodville, South Australia, with final assemblies coming from existing plants at Melbourne, Pagewood (Sydney), Birkenhead (Adelaide), Perth and Brisbane. Engines, castings, transmissions and main mechanical components will be supplied by the 55-acre $7.7 million unit at Fishermen's Bend, and bodies and all pressed metal parts by the 55-acre $5.6 million unit at Woodville. Under agreement with the Australian government, only 10 per cent of the car's list price and 5 per cent of the car's weight will represent imported accessories and components, and it is estimated that present annual buying of Australian materials by GM will increase by nearly $10 million through production of the Holden, with about 600 suppliers involved.

The Holden is of integral body-frame construction, 103-inch wheelbase and 172 inches overall, curb

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The Holden, first Australian-built motor car, now is in quantity production in General Motors Australian plants. Specially designed for that country's driving conditions, the car will be assembled mostly from components made in Australia

weight approximating 2200 lb. Although overall height is less than 62 inches, road clearance of 8½ inches minimum is provided, a necessary feature on Australian roads. Tread is 53 inches front, 54 rear. Front suspension is independent coil springs, semielliptic springing being used on rear wheels. Four-wheel brakes are hydraulic, and double-acting hydraulic shock absorbers are used on both front and rear.

Power plant is an overhead-valve, 6-cylinder, four-bearing unit, with displacement of 132.5 cu in., rated at 21.6 horsepower and developing 60 brake horsepower. Transmission is by a single-plate dry disk, cushioned by multiple springs, and an open propeller shaft balanced, front and rear in needle-bearing universals. Gearbox is of the three-speed selective type and final drive hypoid, with semifloating axles operating in a pressed steel banjo-type housing.

Manufacture of a car in Australia has been a much-discussed idea for many years, with the first step to translate it into fact being taken in January, 1945. Then, in response to a request from the commonwealth government to the Australian motor industry, GMH offered to undertake the task. The company had operated assembly plants there since 1931 and is now the largest automobile company in the southern hemisphere. It is controlled by General Motors Overseas Operations Division. Extent of the GMH postwar expansion is illustrated by the fact that when the first Holden model came off the line last month, the company's total outlay to cover extension of Australian operations had reached upward of $25,520,000.

In developing the project, the actual procedure was to draft commercial specifications of a car suitable to the needs of the country, and to forward these data to Detroit. There an engineering team was organized and it was assisted by a party of 30 Australian manufacturing and engineering technicians. Three prototype cars were built and put through extensive tests at the GM Proving Grounds. Their appearance occasioned much comment around Detroit before they were shipped out to Australia late in 1946.

While tests on the car were being carried out, GMH was able to achieve the second major part of its production planning—erecting and equipping the two new manufacturing plants and training the necessary staffs. At Fishermen's Bend alone this work involved the erection, equipping and staffing of a $5.6 million machine shop and a $1 million gray iron foundry, along with a $1 million engineering department. Altogether, the company's six Australian plants, co-ordinated and directed from a central office at Fishermen's Bend, occupy 148 acres and employ more than 8300.

Hudson 40 Years Old

LOOKING back over four decades of automobile building, researchers at Hudson Motor Car Co. disclose the company was organized on Oct. 29, 1908, by eight men who were destined to become known nationally and internationally. They were J. L. Hudson, R. B. Jackson, Hugh Chalmers, H. E. Coffin, R. O. Bezner, Roy D. Chapin, J. J. Brady and Lee Counselman. Forming a partnership to build a car for less than $1000—no easy matter in those days—they approved designs for the Hudson model 20 in February, 1909, and manufacturing was started in July of the same year with 500 men at work and a total capital investment of only $20,000. Over 4000 sales were recorded in the first year's business.

Expansion and progress were steady and many engineering firsts are accredited to Hudson designers and engineers. Two years ago, at the automotive golden jubilee, none of the original founders of the company was alive, but their original puny investment had grown to plants and equipment valued in excess of $50 million. And in 1947 another $16 million was poured into facilities for building the present uniquely-designed model.

K-F Leases Warehouse Depot

KAISER-FRAZER has concluded negotiations for the lease of a parts and accessories warehouse depot in Franklin Park, Ill. The structure will be built on 10 acres of land and will provide 218,000 sq ft of storage and shipping facilities. It is scheduled for completion in about nine months.

Doubles Equipment Investment

SINCE 1941 the automobile industry has doubled its investment in production machinery, and motor vehicles and parts plants now have in operation an estimated 400,000 machines, valued at $2.5 billion.

RFC Rejects Tucker Loan

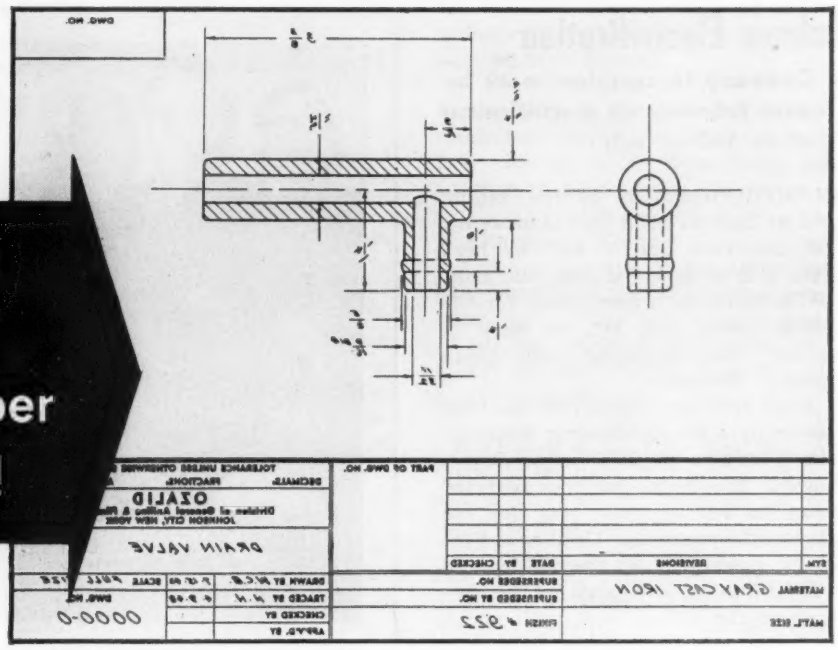
RECONSTRUCTION Finance Corp. has turned down Preston Tucker's request for a $30 million loan. RFC officials said last week that the request was denied about three weeks previous to the announcement and Tucker's Washington representative was immediately notified.

In a recent Washington press conference Tucker said he was aiming at getting additional capital for his auto firm in two ways: 1. A syndicate of private investors putting up $10 million and 2. a requested loan from the RFC of $30 million. He said at the time he had been on a tour of the country and did not know the status of the request.

Sponsors Model Competition

THE 1949 model car competition of the Fisher Body Craftsman's Guild will offer $65,000 in cash awards and university scholarships to boys throughout the nation who can design the best model automobiles. An annual event for a number of years past, the competition is offering as an aid to contestants a new booklet on model car design and construction prepared by Fisher Body engineers.

You're looking at the NEW intermediate paper for mass users!



The drawing above was reproduced on the new Ozalith Intermediate Paper. This duplicate paper original gives you Ozalid prints of maximum line density.

This New Ozalith Paper Costs Little—Has Great Mechanical Strength—Washable, Plastic Surface!

If your operation demands the duplication of a large bulk of drawings and plans, this new Ozalith Intermediate Paper should be of great interest to you.

For it is the answer to the need for a reasonably priced (7½¢ per square foot) paper duplicate original having maximum possible toughness of base; permanence, for filing and record use; and highest reprint quality. It reprints at exceptionally high machine speed.

No Tendency To "Bleed"

The dye image will not offset or transfer to other papers or tracings with which this new Ozalith paper has been placed in contact. There is no tendency to "bleed."

Ozalith is coated on a 100% rag base of great mechanical strength. It will not deteriorate appreciably with age. It is the most durable intermediate paper known.

Pen And Pencil Additions

You can wash Ozalith with a damp cloth —dust, dirt, and grease will come off quickly. Water will not cause the base to cockle or the image to run.

Pen or pencil additions can easily be made on either side of an Ozalith print. Because of its high transparency, contact prints should be made, and additions then made on the unsensitized surface.

Ozalith is a running mate to Ozacloth —but because of its low price, it is ideal for mass users. Write, today, if you would learn more about this and other Ozalid prints.

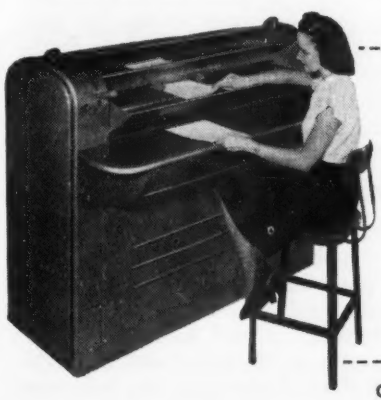
ALL OZALID PRINTS PRODUCED IN SAME MANNER

★ **No tie-ups when you shift from one type of print production to another. Simply choose your Ozalid material . . . and your Ozalid print-making machine exposes and dry develops it. Standard work prints are produced in 25 seconds.**

★ **Your drawings can be up to 42 inches wide, any length. Roll stock or cut sheets can be used. (Special machines accommodate 54" wide drawings.)**

★ **You—or anyone else—can be the operator. A few hours and you're an "expert."**

★ **See *all* the Ozalid prints you may make from any drawing . . . and learn full story. Mail coupon today.**



DEPT. NO. 205

OZALID . . . A Division of General Aniline & Film Corp., Johnson City, New York

Gentlemen: Please send free copy of Ozalid Streamliner booklet illustrating all types of Ozalid prints.

Name_____ Position_____

Company_____

Address_____

Ozalid in Canada—Hughes Owens Co., Ltd., Montreal

Lukens Electrification

Company to complete work by next February on electrification of its 140-in. mill

ELECTRIFICATION of the 140-in. mill at Lukens Steel Co., Coatesville, Pa., has been started and by next Feb. 1 it is expected that the unit, which serves as a breakdown for the 206-in. plate mill, will be back in service and operating with much greater efficiency.

Since 1903 the 140-in. mill has been driven by a non-condensing Wetherill steam engine of 2250 rated horsepower. The engine has been removed from its pit to make way for the electrical equipment. Until next February, production on the 206-in. mill will be lowered somewhat by the idleness of the 140-in. unit with which it is used. In the interim, the larger mill will be used as both a breakdown and finishing unit.

New Motor — The new electrical equipment will include an electric motor of 4000 hp, at 400 revolutions per minute. It will be a slip ring, wound rotor, three-phase 60-cycle induction motor, operating on 13,200 volts a.c. The motor will be equipped with a new reduction gear, and the present pinion stand will be moved to give a longer spindle drive. An electric control panel will also be installed.

The new motor and its controls will be located in a building to be constructed partly on the site of the old steam engine base and also to the east, adjoining the 140-in. mill structure. A new crane runway also will be constructed as part of the improvements, the total cost of which is expected to approximate $400,000.

INDUSTRIAL PREPAREDNESS: Industrial mobilization was the main agenda topic at this recent meeting of Army logistics officers and business executives, sponsored by the Philadelphia District of the Pressed Metal Institute. Front row, left to right, Brig. Gen. John K. Christmas, Chief of Procurement Group, Logistics Division; Walter A. Gorrell, president, E. J. McAleer & Co. and vice president, Pressed Metal Institute; Brig. Gen. Hugh B. Hester, Philadelphia Quartermaster Depot; Col. Dan R. Neff, Chief of Engineering Procurement; and, rear row, Herman Kesler, President of American Metal Specialties Corp.; Col. Tyler Barney, Department Chief, Philadelphia Ordnance District; Col. Ward E. Becker, Commander of Frankfort Arsenal; Lt. Col. E. R. Huff, Philadelphia Ordnance District.

Merge Power Equipment Firms

COMBUSTION Engineering Co. Inc. and Superheater Co., both of New York, have agreed to merge, subject to approval of stockholders. Special meetings of stockholders of the two companies have been called for Dec. 22 to vote on the proposal.

The name of the new company would be Combustion Engineering-Superheater Inc., and the merger would be effective Dec. 31. Both companies are manufacturers of power equipment. In 1933 Superheater acquired a 75 per cent interest in Combustion Engineering, and since then the two firms have worked closely together.

The new company will continue all the activities of the present firms, including, in addition to steam generating and associated products, such equipment as chemical recovery units for pulp mills, flash drying systems for a wide variety of materials, sewage incineration systems, pulverizing apparatus, soil pipe and castings, domestic water heaters and range boilers.

Maremont Buys Merrill Spring

MAREMONT Automotive Products Inc., Chicago, manufacturer of springs, mufflers, harrow disc blades and plow blades, has acquired E. R. Merrill Spring Co., New York.

William C. Merrill Jr. and William Foster Jr., president and general manager respectively of Merrill, will remain with the new division in management capacities. The unit's spring production will supplement Maremont's line.

Yale Discontinues Electric Irons

YALE & Towne Mfg. Co., New York, has stopped making the Tip Toe electric iron, which was produced at its Buffalo plant.

Manufacture and sale of electric heating units, however, will continue at Buffalo. This line was recently supplemented by "moisture-proofed" electric water heater units which are now being shipped to manufacturers and servicemen. A special chemical seals all terminal points on the product against moisture penetration.

A company spokesman said the suspension of the electric iron will have no effect upon the operation of the nine other divisions of the company. He explained that Yale & Towne has decided to concentrate on its regular lines of locks, builders' finishing hardware, materials handling equipment, heater units and other products.

Piper Aircraft Buys Stinson

SALE of the Stinson Division of Consolidated Vultee Aircraft Corp. to Piper Aircraft Corp., Lock Haven, Pa., has been announced by Floyd B. Odlum, Convair Board chairman.

Transaction involves outright sale of all equipment, tools, spare parts and finished planes to Piper, but not the Stinson plant at Wayne, Mich. A Piper shareholders meeting will be called for Jan. 18 to consider change of name of the corporation to Piper-Stinson Aircraft Corp.

Briefs . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Standard Transformer Co., Warren, O., manufacturer of transformers for distribution, power, metering, testing and street lighting, has appointed E. G. Norton Co., Boston, as its New England representative.

—o—

Tracy Mfg. Co., Pittsburgh, manufacturer of kitchen equipment, has named Joseph Straus Co. Inc., Buffalo, as a wholesale distributor for western New York; Stern Bros. Plumbing Supply Co., Cleveland, for northeastern Ohio; and Superior Distributing Co., Kansas City, Mo., for Kansas City.

—o—

Westland Mining Co., Toronto, Ont., has acquired a 500-sq-mile prospecting concession in Labrador from the Newfoundland government. Westland has optioned the concession to a group including Canadian and American steel interests.

—o—

Timm Aircraft Corp., Los Angeles, has leased its Van Nuys, Calif., plant to Marquardt Aircraft Co., subsidiary of General Tire & Rubber Co., for a period of six years with an option to purchase.

—o—

National Iron Works, San Diego, Calif., steel fabricating firm, has formed a subsidiary, National Tuna Clippers Inc., to secure part ownership in tuna fishing vessels.

—o—

Cleveland Automatic Machine Co., Cleveland, maker of screw machines and die casting machines, has moved its New York district office from New York City to 1060 Broad St., Newark, N. J.

—o—

Toro Mfg. Corp., Minneapolis, maker of lawn mowing equipment, has purchased Whirlwind Corp., Milwaukee, manufacturer of power mowers. Whirlwind will be a Toro subsidiary.

—o—

Airmatic Valve Inc., Cleveland, manufacturer of automatically controlled vacuum, pneumatic and hydraulic valves, has appointed Nilsen Engineering Co., Salem, Mass., as sales representative in New England.

—o—

Illes & Larkin, Cleveland, manufacturers' representative, has been dissolved and succeeded by Illes Power Control Co.

—o—

Designers for Industry Inc., Cleveland, product and development engineering firm, is expanding its sheet metal products division.

—o—

Sprague Electric Co., North Adams, Mass., has acquired Herlec Corp., Milwaukee, manufacturer of ceramic capacitors and printed circuits. Milwaukee operations will be under the continued direction of Herlec executives, including Milton Ehlers, Herlec president. Sprague is also establishing a plant for the manufacture of capacitors at Nashua, N. H.

—o—

Philco Corp., Philadelphia, has signed an agreement to acquire the net assets of Electromaster Inc., Mt. Clemens, Mich., manufacturer of electric ranges, subject to approval of Electromaster stockholders. Electromaster will be operated by its present management as a Philco division.

—o—

General Electric Co., Schenectady, N. Y., has opened a $3 million plant at San Jose, Calif., which will have a production capacity of 1500 electric motors weekly. The factory, constructed to allow for multiple expansion, ultimately will produce all the company's single-phase capacitor integral motors.

—o—

E. A. Bibey Co., Pittsburgh, manufacturer of water heater coils and accessories, has been sold to Roy E. Manning, formerly national sales manager of Pittsburgh Water Heater Co. The plant and business will continue in operation.

—o—

Butterfield Division of Union Twist Drill Co., Derby Line, Vt., manufacturer of taps, dies, reamers and other products, has named Garrett Supply Co., Los Angeles, as a distributor in the Los Angeles area, and Arrow Machine Tool Co., Providence, R. I., as a distributor in the Providence vicinity.

—o—

Lockheed Aircraft Corp., Burbank, Calif., has purchased Aerol Co., manufacturer of wheels, casters and hand trucks. Aerol will continue under its own name as a division of Airquipment Co., a Lockheed subsidiary.

—o—

Foxboro Co., Foxboro, Mass., has announced plans for an enlarged program of instruction at its instrumentation school which begins Jan. 10.

—o—

Dravo Corp., Pittsburgh, has appointed Superior Coal, Coke & Fuel Oil Co., Ft. Wayne, Ind., as a distributor of Counterflo heaters in northeastern Indiana.

—o—

Cerro de Pasco Corp., New York, has appointed Peck Steel & Die Supply, Los Angeles, as its West Coast distributor of Cerro alloys.

—o—

Westinghouse Electric Corp., Pittsburgh, reports that 16,783 employees have purchased 289,742 shares of company stock. This number represents 17 per cent of the Westinghouse personnel who are eligible to participate in the program.

—o—

Churchward & Co. Inc., West Haven, Conn., is adding a 35-ft luxury cruiser and a 20-ft utility runabout to its line of 26-ft steel craft.

—o—

Joy Mfg. Co., Pittsburgh, manufacturer of mining equipment, has bought Whitehall Machine & Tools Ltd., Galt, Ont., Canada, for a purchase price understood to have exceeded $750,000.

—o—

Oakite Products Inc., New York, manufacturer of industrial cleaners and allied products, recently held regional technical-sales conferences in New York, Chicago and Kansas City.

—o—

Parker Appliance Co., Cleveland, has appointed Johnson-Sperry Co., Middlefield, O., as a distributor of O-rings in southern Ohio.

—o—

Richmond Radiator Co., Uniontown, Pa., has closed its Uniontown radiator plant. Boiler operations at this unit have been transferred to New Castle, Del. Enameling works operations at Uniontown are not affected.

—o—

McKaig-Hatch Inc., Buffalo, has augmented its line in the hardware field to include totally forged and upset stainless steel wrenches, pliers, auto tire chain tools, open-end wrenches and ball pein hammers.

—o—

Continental Can Co., New York, reports New York Life Insurance Co. has purchased Continental's Portland, Oreg., plant and has leased it to the seller on a long-term, net rental basis.

—o—

Allegheny Steel Band Co., Carnegie, Pa., has begun manufacture of strapping, seals, tensioners, sealers and other accessories for use in banding packages, bales, boxes, bundles and pallets.

—o—

American Standards Association, New York, is reactivating its sectional committee on radio which will co-ordinate civil and military standards.

The Business Trend

DECLINE in production over the Thanksgiving Day holiday lowered STEEL's industrial production index for the week ended Nov. 27 to 166 per cent (preliminary) of the 1936-1939 average. This decline followed eight weeks of postwar record activity during which the index registered 175 per cent or higher. Reflecting the high rate of industrial activity, the Federal Reserve Board's industrial production index for October rose to a peacetime high of 195 per cent of the 1935-1939 average.

STEEL—The holiday, however, did not cut production of steel for ingots and castings, output remaining at 99 per cent of capacity in the week ended Nov. 27. This marked the fifth consecutive week of production at this level. Although new tonnage records were established during October, indications are that November total will be even higher.

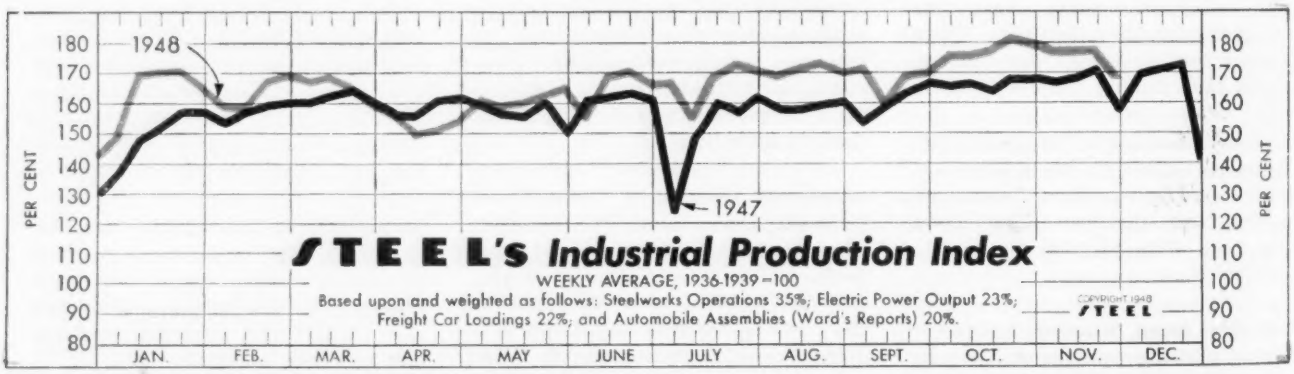
AUTOMOBILES — Effects of the holiday plus the shutdown by one builder due to a shortage of steel resulted in a drop of more than 30,000 units in the total outturn of automobile and truck builders. Production of 90,039 units for the week ended Nov. 27 was the lowest since the week ended Sept. 11.

COAL — Bituminous coal production for the week ended Nov. 20 at 12,265,000 net tons was more than 1 million tons below the aggregate for the corresponding week last year. Cumulative total from Jan. 1 through Nov. 20 at more than 520 million tons is about 51.5 million tons lower than the total for the corresponding period last year. Final figures just released by the Bureau of Mines show that the 1947 total of 630,623,722 tons was the greatest in history.

RAILROADS—Fewer freight cars were on order as of Nov. 1 than on the same date a year ago, according to the Association of American Railroads. Orders totaled 111,405 cars as compared with 126,213 a year ago. In the first 10 months of this year, however, 86,060 new freight cars were put into service against only 46,308 in the same 1947 period. Locomotives on order by class 1 railroads on Nov. 1 totaled 1630, well above the 967 of last year. New locomotives put in service during the first 10 months of this year totaled 1159 compared with 676 in the same period last year.

WAGES—Gross weekly earnings for the 13.4 million production workers in the nation's manufacturing establishments advanced to a new peak of $54.64 in mid-October, according to the Bureau of Labor Statistics. Average factory workweek increased from 39.8 to 40 hours as the decline reported in the nondurable goods industries was more than counterbalanced by an increase in the durable goods division.

PRICES — As reported in the Nov. 29 issue of STEEL, several new indexes make their first appearance in the statistical section of The Business Trend. Although one of the indexes bears the All Commodities title as in previous issues, it is not comparable to the one used in preceding weeks. Metals and Metal Products and STEEL's Nonferrous Metal Composite are entirely new.



Index (chart above): Week ended Nov. 27 (preliminary) 166 Previous Week 177 Month Ago 178 Year Ago 157

BAROMETERS of BUSINESS

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)†	99.0	99.0	99.0	96.5
Electric Power Distributed (million kilowatt hours)	5,374	5,627	5,555	4,983
Bituminous Coal Production (daily av.—1000 tons)	2,044	1,971	2,012	2,231
Petroleum Production (daily av.—1000 bbl.)	5,617	5,659	5,604	5,257
Construction Volume (ENR—Unit $1,000,000)	$80.8	$123.2	$179.1	$116.8
Automobile and Truck Output (Ward's—number units)	90,039	120,718	116,968	84,391

* Dates on request. † 1948 weekly capacity is 1,802,476 net tons. 1947 weekly capacity was 1,749,928 net tons.

TRADE				
Freight Carloadings (unit—1000 cars)	840†	857	932	792
Business Failures (Dun & Bradstreet, number)	101	126	104	72
Money in Circulation (in millions of dollars)‡	$28,305	$28,215	$28,091	$28,725
Department Store Sales (changes from like wk. a yr. ago)‡	−6%	−9%	+12%	+9%

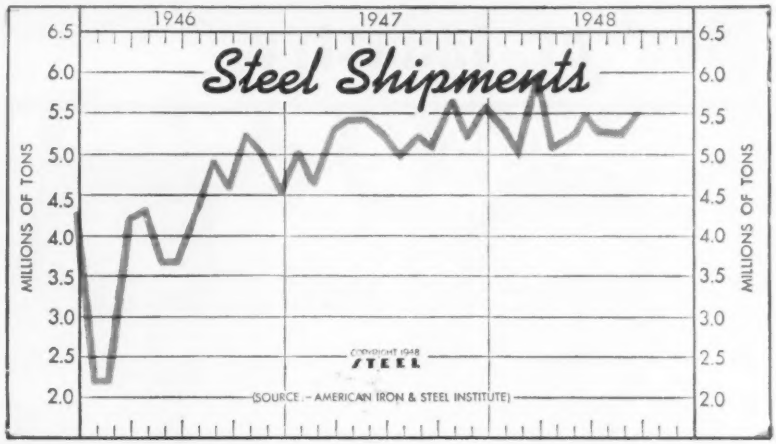
† Preliminary. ‡ Federal Reserve Board.

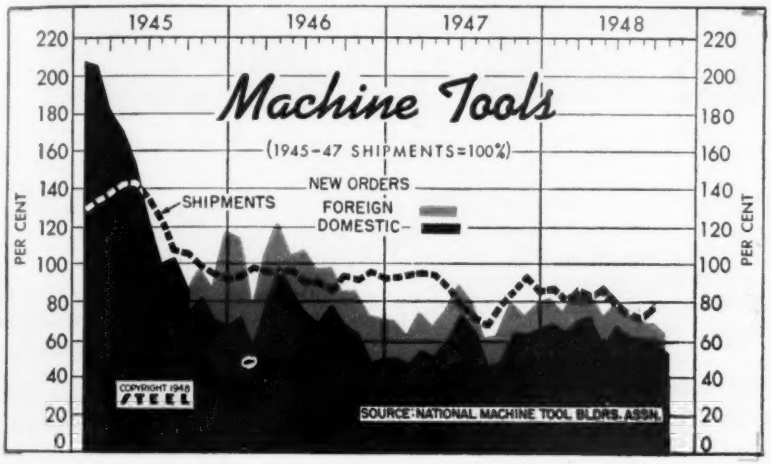
Steel Shipments

(Net Tons)

	1948	1947	1946
Jan.	5,410,438	5,061,333	2,189,369*
Feb.	5,046,115	4,626,424	2,189,368*
Mar.	5,978,551	5,304,415	4,213,913
Apr.	5,096,161	5,445,993	4,335,694
May	5,321,375	5,442,343	3,666,677
June	5,476,774	5,263,711	3,687,509
July	5,229,880	4,974,566	4,259,494
Aug.	5,329,060	5,278,223	4,965,456
Sept.	5,511,474	5,118,839	4,589,902
Oct.	.....	5,681,597	5,260,832
Nov.	.....	5,216,990	5,019,984
Dec.	.....	5,613,036	4,533,420

* Figures for January and February, 1946, are merely averages derived from a report that combined shipments for those two strike-affected months into a total of 4,378,737.





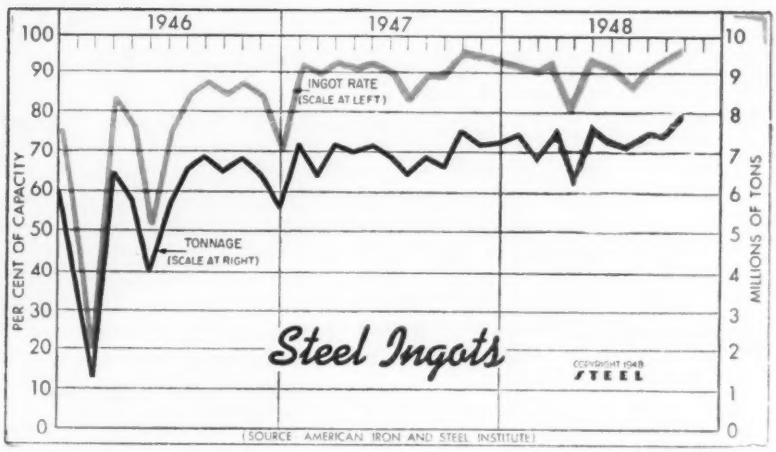
Machine Tools

(1945-47 Shipments=100)

	Orders—Total		Orders—Domestic		Shipments (3 Mos. Ave. Centered)	
	1948	1947	1948	1947	1948	1947
Jan.	83.1	71.7	69.1	50.7	86.9	93.1
Feb.	77.3	63.8	64.6	48.0	81.9	94.8
Mar.	86.3	74.3	70.2	54.2	84.2	95.4
Apr.	86.3	69.8	72.2	51.0	82.7	94.3
May	73.5	76.9	62.1	60.6	86.3	88.9
June	83.4	90.9	71.5	73.7	79.9	79.5
July	74.0	81.1	61.1	64.4	75.3	71.0
Aug.	73.7	62.1	60.9	47.5	72.3	68.6
Sept.	73.1	63.7	61.5	49.0	78.3	78.5
Oct.	67.5	81.0	53.5	65.0	...	85.5
Nov.	...	75.6	...	64.1	...	92.6
Dec.	...	81.1	...	66.3	...	86.1

Steel Ingots

	Production (Net Tons—000)			Operating Rate (% of Capacity)		
	1948	1947	1946	1948	1947	1946
Jan.	7,473	7,213	3,873	93.6	93.0	49.6
Feb.	6,940	6,422	1,393	93.0	91.7	19.8
Mar.	7,608	7,307	6,509	95.3	94.3	83.3
Apr.	6,218	7,043	5,861	80.4	93.8	77.5
May	7,560	7,329	4,073	94.7	94.5	52.2
June	7,256	6,969	5,626	93.8	92.8	74.4
July	7,069	6,570	6,619	88.7	84.9	84.9
Aug.	7,438	6,982	6,924	93.1	90.1	88.7
Sept.	7,416	6,789	6,556	96.1	90.6	86.9
Oct.	7,973	7,560	6,952	99.9	97.5	89.0
Nov.	....	7,233	6,458	...	96.3	85.4
Dec.	....	7,366	5,760	...	95.2	73.9
Total		84,784	66,603	Ave.	92.9	72.5



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$14,475	$13,423	$14,343	$14,052
Federal Gross Debt (billions)	$252.5	$252.5	$252.3	$258.3
Bond Volume, NYSE (millions)	$13.3	$16.3	$21.3	$16.6
Stocks Sales, NYSE (thousands)	4,570	5,176	5,395	3,875
Loans and Investments (billions)†	$62.6	$62.4	$62.3	$64.9
United States Gov't. Obligations Held (millions)†	$33 525	$33,319	$33,416	$37,827

† Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$95.50	$95.05	$95.05	$76.09
STEEL's Nonferrous Metal Composite‡	232.6	232.3	222.3	187.9
All Commodities†	164.9	164.3	164.7	159.8
Metals and Metal Products†	173.8	173.1	172.6	150.9

† Bureau of Labor Statistics Index, 1926=100. ‡ 1936-1939=100.

Men of Industry

D. L. FRAWLEY

E. CLYDE GRIMM

L. A. DIXON JR.

D. L. Frawley has been elected chairman of the board of directors of Mackintosh-Hemphill Co., Pittsburgh. He succeeds the late **H. V. Blaxter.** Mr. Frawley, a director of Mackintosh-Hemphill Co. for more than 16 years, has been associated with the company and its predecessor companies since 1918. He is a director of Oliver Iron & Steel Corp., Follansbee Steel Corp., Pittsburgh Oil & Gas Co., among other companies.

—o—

F. R. Fishback, chairman of the board of Electric Controller & Mfg. Co., Cleveland, has retired. He joined Electric Controller in 1905 and in 1925 was elected president, a post he held until 1943 when he became board chairman. **R. G. Widdows,** president since 1943, will continue in that post, and will be executive officer of the company. Succeeding Mr. Fishback as a member of the board of directors is **A. C. Dyer**, vice president and sales manager.

—o—

George W. Coultas has joined the industrial engineering staff, Parker Appliance Co., Cleveland. He has been associated with the consulting firm of Stevenson, Jordan & Harrison, Reliance Electric & Engineering Co., and with Eaton Mfg. Co. in industrial engineering capacities.

—o—

A. L. Berlin has been appointed assistant to the vice president in charge of sales, Pyle-National Co., Chicago.

—o—

H. E. Balsiger has been appointed director of engineering, Landis Tool Co., Waynesboro, Pa., manufacturer of precision cylindrical grinding machines. He joined the company in 1925. Succeeding him as chief engineer is **R. E. Price,** formerly assistant chief engineer. **W. E. Happel** has been appointed assistant chief engineer. Mr. Price has been associated with Landis Tool Co. since 1929, Mr. Happel since 1926.

—o—

E. Clyde Grimm, eastern district manager of the Samuel G. Keywell Co. Inc., Detroit, has been made vice president of the corporation. He will continue to be in charge of the eastern district of the company with offices in Pittsburgh.

—o—

Arthur F. Peterson has been elected vice president in charge of the Mining Division, Bethlehem Steel Co., Bethlehem, Pa. He succeeds the late **M. L. Jacobs,** and assumes his new duties immediately. Mr. Peterson has been general manager of the Mining Division. He joined Bethlehem in 1924, and had previously been employed by Pickands Mather & Co., Cleveland, stationed in the Michigan ore fields.

—o—

C. F. Seyler, formerly assistant chief engineer, Jones & Laughlin Steel Corp., Pittsburgh, has been appointed manager of construction. In this new office, Mr. Seyler's responsibility will include field construction and installation of all facilities in the improvement program of the corporation and subsidiaries. He has been with Jones & Laughlin since 1922. In July, 1948, he was appointed assistant chief engineer.

—o—

Martin C. Butters, consulting engineer, formerly connected with E. I. du Pont de Nemours & Co., has joined the staff of O. K. Tool Co. Inc., Shelton, Conn., manufacturer of inserted blade milling cutters and single point metal cutting tools.

—o—

L. A. Dixon Jr. has been appointed general manager of the Pittsburgh DuBois Division, Rockwell Mfg. Co., Pittsburgh. Concurrent with his appointment, the company states that expansion plans have been formulated to accelerate production in its tin meter operations, which constitutes the major part of this division's function. Mr. Dixon started in the engineering department of Pittsburgh-DuBois Co. and was made executive vice president in 1944. When Rockwell acquired that company in 1947, Mr. Dixon became the assistant general manager.

—o—

E. A. Nicholas has been elected chairman of the board of Farnsworth Television & Radio Corp., Fort Wayne, Ind., and **Abe Fortas** of Washington, as a director. Mr. Nicholas will continue to serve as president of the company. **Philo T. Farnsworth,** who is a director and who has been conducting special research for the company, was elected a vice president. **Chester H. Wiggin** was elected secretary. **J. B. McCargar, Burton A. Howe** and **Charles B. Buesching** have resigned from the board.

—o—

Jack & Heintz Precision Industries Inc., Cleveland, announces that **Frank R. Kohnstamm** has been appointed senior vice president of the company, and that **Otto T. Hess,** general counsel and secretary of the company, has been appointed assistant to the president. Mr. Kohnstamm was elected vice president last June, after having joined the company in October, 1947, as general sales manager. Mr.

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Hess continues as secretary and general counsel in addition to assuming his new duties as assistant to the president.

—o—

John C. Groffel has been appointed district manager for the St. Louis territory, Caine Steel Co., Chicago. He has been with the company for eight years in various capacities.

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Designers for Industry Inc., Cleveland, announces the appointment of **B. A. Woina,** former chief engineer of Mullins Mfg. Co., as director of its Sheet Metal Products Development & Production Engineering Division. With over 30 years' development and executive experience in the sheet metal field, Mr. Woina has had previous connections with Locke & Co., Murray Corp. of America, Collings Carriage Co., Hupp Motor Car Co., Motor Products Corp., and L. M. Payne Co.

—o—

J. H. Park, for the past year on the sales staff, Electric Machines Inc., Cedarburg, Wis., manufacturer of electric motors, has been appointed sales manager of the company. Previous to joining the company last January, Mr. Park was associated with Westinghouse Electric Corp.

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Arthur W. Krause and **Alvin M. Cunningham** have joined the Engineering Division of Gas Machinery Co., Cleveland. They both recently served with American Gas Association Laboratories.

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Hugh F. Beeghly, research engineer, Jones & Laughlin Steel Corp., Pittsburgh, has returned from Oak Ridge, Tenn., where he has been attending a course in the techniques of using radioisotopes in research. Mr. Beeghly has been investigating the application of radioisotopes, "tracer atoms," to researches in the manufacture and fabrication of iron and steel. The series of courses are offered by Oak Ridge Institute of Nuclear Studies, comprised of 19 southern universities, in co-operation with the Atomic Energy Commission.

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Dr. Albert E. Sidwell Jr. has been appointed assistant director of research, and **Ralph F. Wolf,** manager of compounding research for the Columbia Chemical Division, Barberton, O., Pittsburgh Plate Glass Co.

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James W. Fatkin has been appointed manager of manufacturing, Aviation Gas Turbine Division, Westinghouse Electric Corp., Pittsburgh. He succeeds **Samuel S. Stine,** who recently was named plant manager of the company's new Kansas City works, where jet engines will be built for the Navy. Other appointments which have been announced by the company are **Peter A. Roos,** as superintendent of blade and diaphragm manufacturing at Philadelphia, the post previously held by Mr. Fatkin, and **Dewey H. Martz,** as superintendent of assembly and test for the division at its Philadelphia plant.

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Robert W. Galvin has been appointed executive vice president of Motorola Inc., radio and television firm, Chicago. He has been a director since 1945. He occupies the post which has been vacant since 1944, following the death of **Joseph E. Galvin,** co-founder of Galvin Mfg. Co., forerunner of Motorola Inc.

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W. W. Kuyper has been appointed divisions engineer of the Turbine, Generator and Gear Engineering Divisions of General Electric Co.'s River Works, Lynn, Mass. He succeeds **K. M. Holt,** who has retired after more than 40 years of service to the company. Mr. Kuyper joined General Electric in 1933. He has been associated with the General Division and the Aircraft Gas Turbine Division. While with the latter he was stationed at Muroc Dry Lake, Calif. **E. N. Twogood** has retired as division engineer of the Gear Engineering Division. He has been with the company for more than 38 years. **L. J. Collins** has been appointed to succeed him. **J. J. Zrodowski** has been appointed designing engineer, Gear Engineering Division. He joined the company in 1916.

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Hans A. Bohuslav has been appointed special engineering consultant to R. G. LeTourneau, president of R. G. LeTourneau Inc., Peoria, Ill., and Longview, Tex. He goes to the LeTourneau company from Engineering Controls Inc. of Los Angeles, where he was vice president in charge of engineering and production. He is recognized throughout the engineering profession as an authority on high-power diesel and gasoline engines. From 1942 to 1947 he held the position of vice president in charge of engineering for Sterling Engine Co., Buffalo, N. Y., which designed, built and tested diesel and gas engines for the Army, Navy and Marine Corps. From 1933 to 1942 he served the Enterprise Engine & Foundry Co. as chief engineer and later as vice president in charge of engineering. Mr. Bohuslav will assume his new duties on Jan. 1, and will make Longview, Tex., his headquarters.

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Marcus Transformer Co. Inc., Hillside, N. J., announces appointment of **Lew C. Conover,** 100-A South 21st St., Philadelphia, as its territorial representative for eastern Pennsylvania, Delaware, Maryland, Washington and southern New Jersey.

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Charles H. Coombs has been named New York district manager of Motorola Inc. Formerly connected with Radio Corp. of America as a sales manager in the Eastern Division, Mr. Coombs will service New York, Philadelphia and Atlantic City areas for Motorola Inc., Chicago radio and television manufacturing firm.

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E. I. Sandberg has been named assistant general manager, South Wind Division, Indianapolis, Stewart-Warner Corp., and **T. M. Redmond** has been appointed plant manager. Mr. Sandberg, in addition to his duties as assistant to A. R. Collins, general manager, retains his former responsibilities as controller or chief fiscal officer of the Indianapolis op-

HUGH F. BEEGHLY

ROBERT W. GALVIN

erations. Mr. Redmond, recently head of aircraft heating equipment production, has been with Stewart-Warner since 1936.

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George Carlson, Robert L. Wakelee and **Gordon H. Howes** have been appointed to new positions in the Construction Materials Department, General Electric Co., at Bridgeport, Conn. Mr. Carlson, who was formerly manager of engineering, Conduit Products Division, has been named manager of manufacturing of the division. Since he joined General Electric in 1925 he has been closely connected with the engineering of conduit products and wiring devices. Mr. Wakelee, who becomes materials manager of the Conduit Products Division, joined General Electric in 1934. He was most recently supervisor of production and purchasing in the division. Mr. Howes has been appointed supervisor of general accounting for the Construction Materials Department. Associated with the company since 1924, he was formerly accounting supervisor in the Appliance & Merchandise Department.

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R. A. Dadisman, manager, Market Development Division, Armco Steel Corp., Middletown, O., has been elected vice president of the Porcelain Enamel Institute. He also was reelected to the board of trustees and will serve on the executive committee of the institute.

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Leo H. Dragat, H. Dragat & Sons Inc., Hartford, Conn., was elected president, Southern New England Chapter, Institute of Scrap Iron & Steel Inc. He succeeds **S. Samuel Kasden,** H. Kasden & Sons Inc., New Haven., Conn. **Robert Jacob,** Jacob Bros. Inc., Bridgeport, Conn., was elected first vice president, and **Charles D. McIntosh,** West Hartford, was elected secretary-treasurer.

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Richard W. Schreck has been appointed Michigan divisional sales representative for Watson-Stillman Co., Roselle, N. J. He will work out of the company's Chicago office. Besides his duties in Michigan, Mr. Schreck will act as special consultant on hydraulic machinery for two of Watson-Stillman's representatives: The Frank T. Goetz Machinery Co., Cleveland, and W. K. Milholland Machinery Co., Indianapolis. For two years prior to the Watson-Stillman appointment, Mr. Schreck was associated with Hydraulic Press Mfg. Co., Mt. Gilead, O., as sales engineer for the company's metalworking and plastics

OLIVER McCLINTOCK

molding presses. He will continue to specialize in these fields for Watson-Stillman.

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Oliver McClintock has been appointed assistant industrial manager, Glidden Co., Cleveland. For the past 14 years, Mr. McClintock has served the M. B. Suydam Division, Pittsburgh Plate Glass Co. Pittsburgh.

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James D. Willcox Jr. has been appointed district manager of Elliott Co.'s Houston, Tex., territory. He joined the company in 1935 and from 1937 until his recent appointment was with the Atlanta district office, except for three years of service in the Navy during World War II.

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Paul W. Cotton has been appointed manager of the industrial relations department, Bethlehem Pacific Coast Steel Corp., San Francisco plant.

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Samuel G. Gearhart has been named manager of the Industrial Division, San Francisco office, General Electric Co.

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Tracy Mfg. Co., Pittsburgh, has appointed **James A. Bertha** as regional manager for the Southwest region, with headquarters in Houston, Tex.

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W. E. Madden has been appointed vice president, George Haiss Mfg. Co. Inc., subsidiary, Pettibone Mulliken Corp., Chicago. For the past year he has been sales manager of the Conveyor Division of Haiss.

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J. O. Cross has been appointed director of industrial relations for United States Radiator Corp., Detroit. For the past three years he has been personnel manager for Kaiser-Frazer Corp.

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Harrison J. Groo has joined Cosa Corp., New York, as a sales engineer covering metropolitan New York, and **Robert H. Bennet,** as district sales manager, New England territory.

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J. L. Calderella has been elected vice president and a director of Utica Structural Steel Inc., Utica, N. Y., to succeed the late **Henry H. Rathbun.** Mr. Calderella has been works manager of the corporation for several years.

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Henry Gifford has joined the Heavy Chemical Sales Division, Mathieson Chemical Corp., with headquarters in Chattanooga, Tenn. He will cover Tennessee and adjoining states. Before joining Mathieson, Mr. Gifford was on the sales staff of Allied Chemical & Dye Corp.

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Stephen F. Briggs, board chairman and a director of Briggs & Stratton Corp., Milwaukee, and one of the founders of the company, has severed connection with the firm. He has not been active in the management of the company for some years, his interest lying principally in Outboard, Marine & Mfg. Co., of which he is chairman.

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Paul A. May has been appointed controller of Mine Safety Appliances Co., Pittsburgh. He formerly was assistant comptroller of Minneapolis-Honeywell Regulator Co. Mr. May had previous association with Fruehauf Trailer Co. as assistant controller, and was secretary-treasurer of A. J. Gerrard Co.

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In recognition of outstanding contribution to alloy steel development, the American Society for Metals has conferred its distinguished service award on **William H. Worrilow,** president, Lebanon Steel Foundry, Lebanon, Pa.

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Chester E. Carroll, general manager, Associated Lines Sales Division, B. F. Goodrich Co., Akron, has retired from active business after 30 years with the organization, and **M. G. Huntington** has been named his successor. Mr. Huntington has been assistant general manager of the division.

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John W. Merrin has been appointed manager of sales training for Kaiser-Frazer Corp., Willow Run, Mich.

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New Officers of the National Slag Association, elected at the association's annual meeting, in Washington, Nov. 18 and 19, are: President, **E. L. Flad,** manager, Slag Division,

WILLIAM J. HALL

Production manager, Ivanhoe Division, Reliance Electric & Engineering Co., Cleveland. Noted in STEEL, Nov. 29 issue, p. 72

McMILLAN ROBINSON

Appointed sales manager, Metal Products Division, Baltimore, Koppers Co. Inc., Pittsburgh. Noted in STEEL, Nov. 29 issue, p. 73

FRANK W. EICHMAN

Appointed sales manager of the Philadelphia plant of Joseph T. Ryerson & Son Inc. Noted in STEEL, Nov. 29 issue, p. 70

Carnegie-Illinois Steel Co., Pittsburgh; vice president, **J. A. Mattison Jr.,** president, Woodward Slag Corp., Birmingham; treasurer, **W. S. Shaw,** Washington. **E. W. Bauman** was reappointed managing director. He was with Republic Steel Corp., Cleveland.

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Stephen A. Foster and **Gordon H. Collum** have joined the Philadelphia material handling sales department of Fab-Weld Corp. Mr. Collum was formerly associated with Gates Rubber Co., Denver, and Mr. Foster was connected with the Navy Department.

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William F. Bach has joined Bendix Home Appliances Inc., South Bend, Ind., and will handle special assignments. Formerly with Perfection Body Co., Galion, O., as assistant works manager, Mr. Bach spent 16 years with various manufacturers in the production of home appliances.

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Willard Storage Battery Co., Cleveland, announces appointment of **Herbert A. Fotheringham** as advertising service manager; **Donald I. Ehlenfeldt,** manager of sales promotion; and **William H. Walter,** manager of market research.

OBITUARIES . . .

J. Leonard Replogle, 72, chairman of the board of Warren Foundry & Pipe Corp., Dover, N. J., and a former president of Vanadium Corp. of America, died Nov. 25 at the Savoy Plaza Hotel, New York, where he had been visiting from his home in Palm Beach, Fla. He started his career as office boy for Cambria Steel Co. at Johnstown, Pa., in 1889. He became vice president and general sales manager of that company in 1912. Mr. Replogle served in World War I as director of steel supply of the War Industries Board.

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Louis Kuehn, 81, founder and former chairman, Milcor Steel Co., Milwaukee, and a director of Inland Steel Co., Chicago, died Nov. 27. In 1896 he started the La Crosse Steel Roofing & Corrugating Co., La Crosse, Wis. In 1902 he organized the Milwaukee Corrugating Co., Milwaukee, and acquired Eller Mfg. Co., Canton, O., in 1929 as part of his firm, the name of which was changed to Milcor Steel in 1930. Six years later Mr. Kuehn sold the firm to Inland Steel Co., and for the past year it has been known as Inland Steel Products Co. Mr. Kuehn was president of the Milcor firm from 1902 to 1938 when he became chairman of the board. He retired in 1940.

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William B. Cushing, retired works accounting supervisor at Cleveland for American Steel & Wire Co., died recently at his home in Donora, Pa. He retired two years ago after 46 years with the company.

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J. Clark Godfrey, 57, who retired in 1945 as assistant to the vice president and works manager in the New York office, Otis Elevator Co., died Nov. 26. He had been with the company for 38 years, and had been its representative in London, Paris and Berlin.

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Lawrence R. Quinn, 60, vice president, Enameled Metals Co., Etna, Pa., died Nov. 25. He also was a vice president, National Enameling & Mfg. Co.

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Austin W. Clark, 53, treasurer and comptroller, Carborundum Co., Niagara Falls, N. Y., died of a heart attack Nov. 21.

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John W. Wilson, 62, who was employed as a developing engineer for Nordberg Mfg. Co., Milwaukee, died recently.

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Clyde E. Breitinger, 52, division superintendent, Westinghouse Electric Corp., Pittsburgh, died recently. He had been associated with Westinghouse for 36 years.

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LeRoy A. Christian, 74, president, Nash-Christian Foundry Supply Co., Birmingham, died recently. Formerly with Birmingham Foundry Co., Mr. Christian became owner and president of Nash-Christian Co. in 1908.

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R. W. Schneider, sales engineer, Isaacson Iron Works, Seattle, was killed recently in a traffic accident near Bozeman, Mont.

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Hubert M. Rosencrans, 59, assistant director of sales, Grasselli chemicals department, E. I. du Pont de Nemours & Co. Inc., Wilmington, Del., died Nov. 25.

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Howard L. Keeler, 54, an industrial analyst for Wright Aeronautical Corp., Paterson, N. J., died Nov. 26 in Bronx Veterans Hospital.

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Andrew H. Loranger, 57, former assistant sales manager for the Cleveland district, Republic Steel Corp., died Nov. 24. Illness forced him to retire from Republic in 1946 after he had worked for the corporation for 34 years.

Engineering News . . . AT A GLANCE

FREIGHT TARIFF REDUCER—An experimental consumer goods shipment in which a disposable paper pallet played a key role may result in the establishment of lower freight rates on pallet shipments handled by maritime intercoastal lines. Bristol-Myers Co., New York, reports that during the shipment only one-fifth of the time was required for handling a palletized load at the plant—20 per cent in direct charges being saved for transportation of the unit load. Steamship line involved made a saving of 80 per cent in man-hours needed for handling prior to shiploading, and shaved off another 50 per cent in shiploading man-hours. Same man-hour savings were duplicated at the port of destination.

KID-GLOVE OPERATION—When handling glass netting wire—used to reinforce glass panels—personnel involved wear buckskin gloves as the slightest touch by human hands might cause corrosion of the wire. According to Harold F. Jacobsen, director of packaging and loading, American Steel & Wire Co., Cleveland, corrosion of the wire results in the formation of air bubbles when the netting is placed in the molten glass. During shipment, a dehydrant like silica-gel is placed inside the containers to exclude any possibility of condensation through high humidity.

DELIVERS IN ANY DIRECTION—Four-way conveyor that can be curved into more than 90-degree turns with such turns possible in floor space of only 6 feet is currently being tested in several plants according to the manufacturer, H. W. Creager Mfg. Co., Arvada, Colo. The unit is flexible horizontally and vertically at the same time and can be formed into S or L-turns to accommodate practically any situation. It is reversible, and capable of handling any type product due to a continuous metal platform that rides on a chain.

FAST TIN DETECTOR—Percentage of tin in solder can be determined in a matter of 2 minutes or less by a nontechnical employee with a method developed by the research department of Continental Can Co., New York. The analyzer, which the company recently licensed Wheelco Instruments Co., Chicago, to manufacture, operates on the principle that alloys of tin and lead have a lower solidifying temperature than pure lead. Thus, the greater the percentage of tin, the greater the difference in the two solidifying temperatures. An electric current generated by the difference in temperatures actuates a sensitive meter which discloses the percentage of tin.

FLAME MACHINING—Fast replacement of worn cast-iron or cast-steel sprockets and gears is now possible through a new, cost-saving method of flame machining announced by Cogmatic Co., Milwaukee. Twelve-inch sprockets of steel plate may be machined in about 5 minutes by the method. Other cutting times vary, depending on diameter, thickness and characteristics of the metal. The setup involves the use of a pantograph principle in which an oxyacetylene cutting head assembly mounted on a track, moves forward and backward by mechanical linkage. The movement is transmitted by following the contour of one of 20 basic cams, design of which reflects standard and special sprockets and gears. Cutting head is led into the path of a revolving steel blank, turning rate of which is related to speed of the cutting head.

PLATING TIP—Electroplated aluminum should not be used for articles to be exposed to severely corrosive conditions, according to Walter R. Meyer, president, Enthone Inc., New Haven, Conn. It is safe, for example, to use electroplated aluminum on interior trim and accessories of automobiles, but it may not be advisable to use it on articles exposed to the weather continuously—bumpers and hub caps—because of the active cell potential set up between aluminum and most plated coatings. (p. 112)

HEAVY MOVERS—Like elevators that are more or less taken for granted in moving materials, industrial locomotives are accorded little of the recognition due them in this age of rapid, economical means of positioning materials at the right place at the right time. However, more will be heard about these heavy material movers as dependence on plant railroads does not end with larger plants. Many manufacturers are turning out locomotives "tailor-made" to suit almost any situation. One company, for instance, currently is producing direct gear-driven diesel and gasoline-powered units up to 15 tons for use on practically all commercially used track gages. (p. 116)

SURFACE CHEMISTRY — In the metalworking industries, surface chemistry is playing an increasingly important role in a variety of operations involving friction, wear and corrosion of metal surfaces. It is generally recognized that a metal surface is a complex of crystal faces, edges, corners, boundaries and disturbed layers. To understand the behavior of the metal surface, properties of these structures must be understood. (p. 130)

ELECTRONIC ROD MILL—Latest type, electronically - controlled, rod mill now operating in the Alton, Ill. plant of Laclede Steel Co., not only is speeding production, but also is relegating the role of the operator to that of a "button-pusher." It delivers two rods simultaneously from 19 stands set in tandem. The hot billets up to 2½-inch square and 40 feet in length are fed into the roughing train to be delivered as finished rods in preselected sizes ranging from No. 5 to ¾-inch. Near instantaneous speed response between rolls is reported to make possible better and more uniform coils. (p. 134)

HOW TO SELECT INORGANIC

By WALTER R. MEYER
President and Technical Director
Enthone Inc.
New Haven, Conn.

A WIDE variety of inorganic finishes is available to the designer for finishing his products. Among these are electroplated finishes, hot dip coatings including tin, tin-lead, zinc and aluminum, oxide coatings, phosphate coatings and oxidized finishes produced by sulphide solutions. Immersion metallic coatings deposited from aqueous solutions are also used to some extent. The selection of the coating will naturally depend upon what property or properties are desired for the particular job.

Electroplated finishes may be applied for corrosion protection, wear resistance, beauty, solderability, low electrical contact purposes, reflectivity and many other reasons. In regard to corrosion resistance, two metals are deposited to give electrical and chemical corrosion resistance to steel articles. These metals are zinc and cadmium.

Use of Zinc Gains—Zinc is finding wider application than cadmium because of the very high price of cadmium (approximately $2.00 per pound). For outdoor corrosion protection, zinc and cadmium protect steel about equally based on equal thicknesses. However, cadmium is sometimes preferred for several reasons. Cadmium is soldered readily and is preferred whenever component parts must be soldered, particularly those objects that cannot tolerate acid type fluxes. Both zinc and cadmium can be electroplated from solutions to give brilliant deposits. However, the brilliance is gradually lost by the development of tarnish. Protection afforded by these two metals is roughly proportional to the thickness applied. This is not so, however, for other electroplated coatings that protect mechanically rather than electrochemically.

In regard to the application of zinc, the user should be aware of certain features of zinc plating solutions before specifying zinc plate. For example, shapes such as strip, wire or sheet are zinc plated most readily in acid type solutions. For plating on complicated shapes, however, alkaline type solutions are necessary because zinc will deposit in recesses better from such solutions. However, certain alloys cannot be successfully plated directly with zinc from cyanide solutions, notably cast and malleable iron. Cast iron can be plated from acid zinc solutions but if the article is of a complicated nature the plate may not deposit in recesses.

Other metals normally plated such as copper, nickel, chromium, silver and tin do not offer electrochemical protection to iron or steel and as a result they act only as mechanical barriers to corrosion. If such coatings are scratched through to the base metal, corrosion may actually be accelerated. There is no direct correlation between thickness of plate deposited and degree of protection afforded. Amount of protection depends upon how few pores there are in the plate that is deposited. Good protection may require thicknesses as high as 0.002 to 0.003-inch.

Electroplated coatings are used very widely for increasing the wear resistance of machines or moving parts. The most commonly used metal is chromium, which is deposited in thicknesses ranging from 0.0001 to 0.010-inch. The application of heavy chromium deposits has been discussed in many articles and will not be considered further at this time.

It should be pointed out that electroplated coatings usually possess greater hardness and toughness than metals of the same composition that have been formed by rolling, casting or other mechanical means. For example, electroplated platinum is greatly superior to rolled platinum in hardness. Another metal that is deposited to increase wear resistance is nickel. Parts are frequently electroplated to increase size in addition to giving better wear resistance. Usually one of three metals is used for this purpose, namely

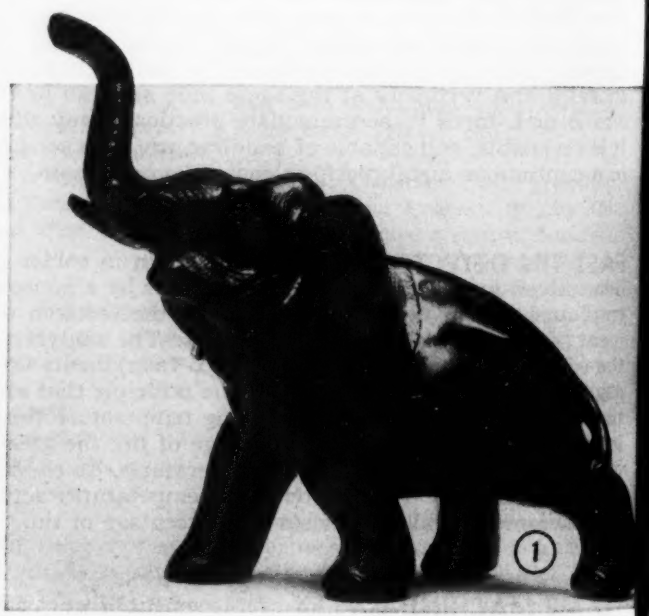


Fig. 1—Zinc die casting blackened by chemical means

Fig. 2—Eye appeal of steel gears is increased by a black oxide coating

Fig. 3—Copper plated objects are easily blackened chemically

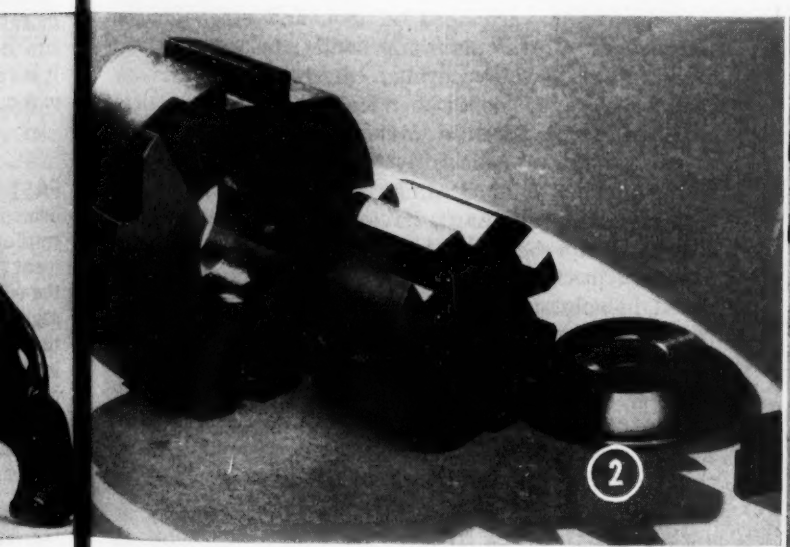
C FINISHES

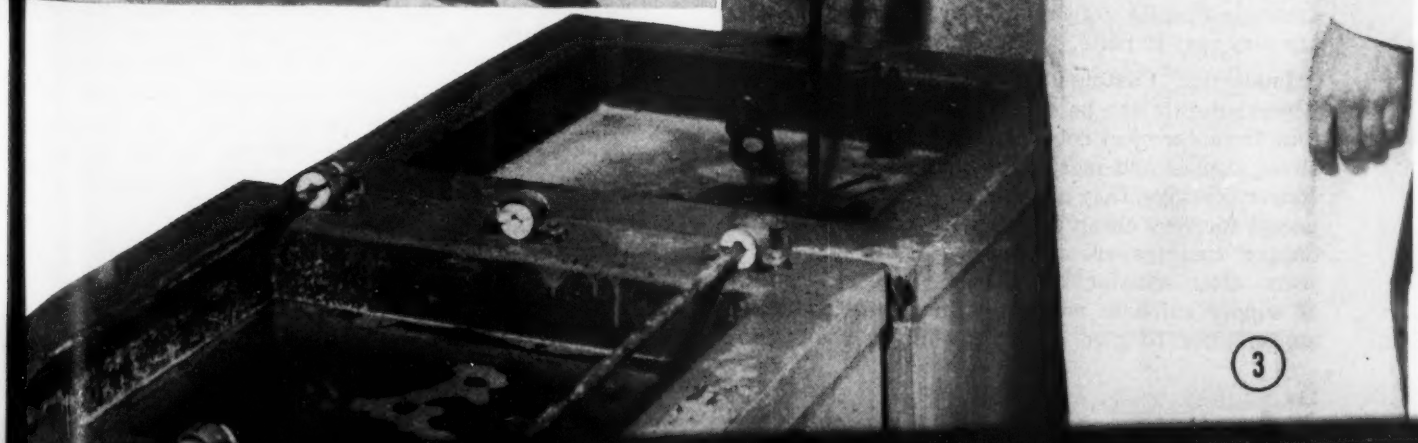
Hot dip coatings, including tin, tin-lead, zinc and aluminum, oxide and phosphate coatings and oxidized finishes produced by sulphide solutions are among the many finishes available to designers. Selection of coating depends upon properties desired in the finished part

iron, nickel or chromium. Iron is frequently used where very heavy coatings must be deposited. Commercial plating shops are now equipped to do this work on a rather large scale.

Plating on Aluminum—Wider use of articles made of aluminum was retarded for a long time by the inability to apply successful electroplated finishes. However, at the present time this difficulty has been largely overcome except for certain alloys, particularly those high in silicon (12 per cent or more) and magnesium (2½ per cent or more). Several processes have been developed for electroplating upon aluminum. One of these involves the chemical deposition of a zinc-copper film by immersion in an alkaline solution (Alumon process of Enthone Inc., New Haven, Conn.). The process consists briefly of cleaning the aluminum surface, immersing in the Alumon solution and then applying the electroplate. Direct plating of copper, zinc, cadmium and nickel can be done on the coating. Work of all types is being electroplated using this method, including large objects such as castings for "juke" boxes, camera parts, chaise lounges, chairs and hardware. In regard to hardware, barrel plating is being done upon aluminum on items such as window fasteners, door stops and coat hangers.

Because of the active cell potential set up between aluminum and most plated coatings, electroplated aluminum should not be used for articles to be exposed to severely corrosive conditions such as immersion in water or exposure to outdoor atmospheres. It is safe, for example, to use electroplated aluminum





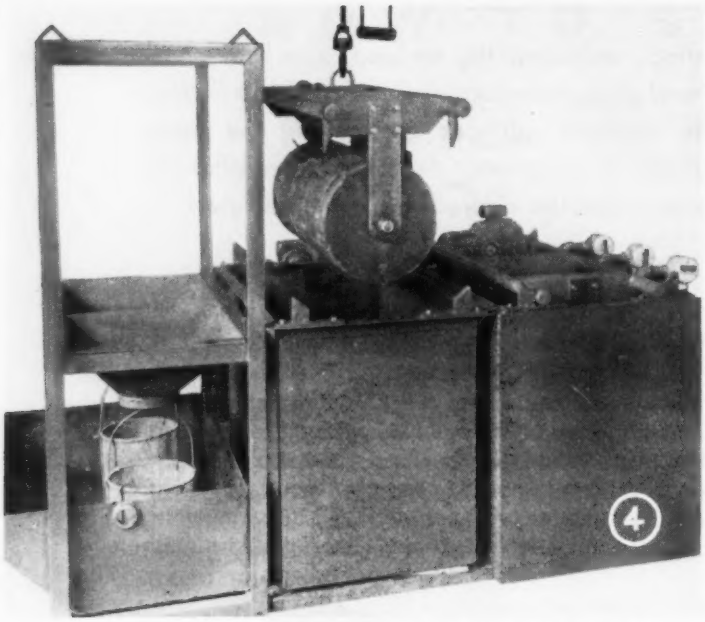


Fig. 4—Barrel equipment for bulk blackening

on interior trim and accessories of automobiles but it may not be advisable to use it on articles exposed to the weather continuously, such as bumpers, outside door handles or hub caps.

Even though a continuous coating may be applied of the order of 0.003-inch, if the coating is abraded through, a strong chemical cell is set up between the aluminum and the plate which results in corrosion of the aluminum. This corrosion causes the aluminum to dissolve and the plate is undermined, resulting in a blister or a pit at the surface. The same thing happens if electroplated objects made of aluminum are subjected to continuous immersion in water.

It might be said in defense of electroplated aluminum that electroplated steel is subject to this type of corrosion but the cell potential is not as high and the extent of corrosion is not as rapid. Stains and products of corrosion for electroplated steel, however, may be more noticeable because they are red or brown, whereas the products of corrosion of aluminum are colorless.

Those alloys that can be plated best should be taken into consideration. Two metals contribute greatly to difficulty in plating. These are magnesium and silicon. It is best that the silicon be maintained at 8 per cent or lower, and the magnesium content 2½ per cent or lower. Good casting alloys are now available that do not require any silicon. Such alloys are very easy to plate.

Immersion Coatings From Chemical Solutions—Several metals can be deposited without electric current from chemical solutions. These include tin, zinc, silver, copper and mercury. In regard to immersion copper coatings, they are seldom used as final finishes except for very cheap objects such as nails and tacks. Copper coatings are applied by immersing the objects, after satisfactory cleaning, in acid solutions of copper sulphate with or without the addition of an inhibitor to give a bright uniform coating. The deposits are relatively thin, ranging in thickness from a few millionths of an inch to several hundred thousandths of an inch. Their chief use at the present time is to assist in the drawing of steel objects, such as shells or wire where copper acts as a lubricant.

Immersion tin coatings are deposited from aqueous solutions upon steel, copper alloys and aluminum. Common pins have been tinned for years by an immersion process using an acid type solution. Tin is being deposited upon aluminum in alkaline solutions. Widest use of immersion coatings of tin occurs in the coating of copper and brass. Beautiful bright adherent deposits of tin can be applied in bulk or on racks to copper and brass from solutions containing sodium stannite, sodium hydroxide and sodium cyanide. Electrical contacts, shells, screws, and millions of pounds of other work are given a cheap, bright, attractive finish by such means. Tin coatings are relatively thin, having a thickness of the order of hundred thousandths of an inch. They increase the solderability of copper and brass. However, if the objects stand for considerable lengths of time, for example six months to a year, ease of soldering decreases greatly.

Silver can be deposited by chemical displacement from cyanide and thiosulphate solutions upon steel, copper and brass. Bright deposits are formed on copper alloys from cyanide solutions that have fundamentally a decorative function. Such deposits are used only on cheap objects because the coatings are very thin.

Oxide Coatings—Many types of oxide coatings are available for use by the machine designer. Oxide coatings can be produced on iron and steel, copper and copper alloys, aluminum and zinc. In regard to aluminum, oxide coatings can be produced both chemically and electrochemically. Electrochemical coatings are produced by making the work the anode in various types of electrolytes, such as chromic acid and sulphuric acid. Coatings produced by sulphuric acid anodizing are hard, have good electrical resistance and can be dyed to various colors. Coatings produced in chromic acid are thinner than those produced in sulphuric acid baths and such coatings are preferred when the aluminum contains recesses where rinsing is difficult. Even though the thickness of such coatings is thinner than those produced in sulphuric acid baths, the corrosion resistance is comparable, due probably to the presence of some chromium compounds in the pores of the coating.

Another method of producing thin but corrosion-protecting oxide coatings on aluminum involves the use of alkaline dichromate solutions modified in various ways. Objects to be treated are cleaned and then immersed in the alkaline dichromate solutions for various lengths of time, varying from 1 to 15 minutes at temperatures from 200° F to the boiling point. Coatings are usually gray or gray-green in color.

On certain alloys, particularly those not containing copper, they will give corrosion resistance to standard salt spray of 250 hours or more. The coatings are relatively thin (*Please turn to Page* 142)

Carbide Die Construction

. . . accelerated by widespread interest in processes for fabricating alloy steels

FOR the past several years, carbide dies have been taking their place in almost every phase of the stamping, forming, and drawing of metals. In the past year, the carbide die program has been greatly accelerated, due largely to the efforts of the carbide manufacturers and a few of the foremost precision die builders of the country. Allegheny Ludlum Steel Corp., Pittsburgh, played an important part, being a major producer of carbide; and with one of the largest lamination stamping departments in the country, a very natural setup for carbide die development was presented.

Tests were run, dies were built, and results obtained. All types of dies were built, tried, and developed. Methods of construction were developed and standard procedures adopted. While the company does not build dies commercially, as a large producer of special steels it is interested in developing processes for fabricating these alloy steels, especially electrical and stainless.

To familiarize die users with practices generally adopted in the manufacture and construction of carbide dies, this discussion is broken down into four steps generally considered when building the dies, and for simplification the discussion is based on building a simple draw die for the first draw operation in a deep draw job, using 1/16-inch cold rolled material having an inside diameter of 4 inches.

The four steps are: 1. Carbide and proper support. 2. Diamond boring. 3. Grinding. 4. Lapping.

Carbide Methods of Holding and Proper Support—In an effort to keep the cost of this ring down to a minimum, the first thing to be considered is the minimum amount of carbide to be used. In this case, since the inside diameter is to be 4 inches, through past experience, we know that a ¾-inch side wall will be necessary, thus the outside diameter will be 5½ x ¾-inch thick. Since the carbide must be backed up and supported as rigidly as possible, much caution must be used in selecting the case material. Outside diameter and thickness of the case should be as large and thick as the machine and setup in which it is to be used will permit. In this case, tool steel forging (ALSC Saratoga) 9 inches outside diameter by 4 inches thick is used as an example. As the carbide must be supported as closely as possible, a shrink fit on this ring is necessary.

A table for carbide rounds of recommended shrink fits is followed very closely at Allegheny-Ludlum. Making a shrink fit of carbide against tool steel is greatly helped by the differences of the coefficient of thermal expansion, the coefficient of expansion of carbide is only one-half that of steel. In casing this ring, the case will need heating to approximately 700° F which is below the draw temperature of the steel case. Thus, the hardness of the case will not be affected. The casing operation is usually done before the inside diameter of the carbide is finished.

Carbide in this particular case will close in approximately 0.002-inch on the inside diameter. By shrinking before finishing the inside diameter, the operation of resizing the ring is saved. The accompanying table represents amount of shrinkage used in shrinking carbide nibs into tool steel casings.

Diamond Boring—Diamond boring is used on dies with one or more radii, or other contours which would be difficult to produce with a straight diamond wheel. Dressing diamond wheels to suit certain contours, angles, or radii is quite limited and costly in respect to labor and the initial cost of the diamond wheel. Therefore, in the case of the above-mentioned draw ring, the drawing radius is 5/16-inch, and this radius would be worked out with a diamond boring tool. A speed of approximately 100 to 120 surface feet per minute would be used. Depth of cut 0.002-inch and 0.004-inch feed per revolution would give best results. Lapping stock of 0.001 to 0.002-inch should be left on the radius or in the cavity after diamond boring.

Grinding—A 100-grit vitrified diamond wheel, 100 concentration, should be used for roughing a 180 to 220 grit wheel with the same concentration for finishing. When mounting a new diamond wheel, extreme care should be taken to make certain the wheel runs as nearly true as possible. The wheel should be indicated on all surfaces and once it is tightened on the mount, should never be taken off that particular mount. These wheels may be trued very efficiently by using a truing setup with a silicon carbide wheel. The silicon carbide truing wheel in this case is not power-driven but is turned only by the diamond wheel revolving against it.

In dressing a radius on a diamond wheel, a very common practice is to use a radii dresser on which is mounted a high speed grinder, with a silicon-carbide wheel revolving in a direction opposite to the diamond wheels. The radius is set on the dresser and the entire grinder is swung. Very active radii may be dressed in this manner. (*Please turn to Page* 157)

RECOMMENDED SHRINK FITS—CARBIDE ROUNDS

Nib Range O.D. From	Under	Shrink Allowance
0.437	0.562	.0013-.0018
0.562	0.687	.0016-.0021
0.687	0.812	.0021-.0026
0.812	0.937	.0025-.0030
0.937	1.125	.0028-.0033
1.125	1.375	.0035-.0045
1.375	1.750	.0038-.0048
1.750	2.000	.0043-.0053
2.000	3.000	.0045-.005
3.000	3.500	.0055-.006
3.500	4.000	.0065-.007
4.000	5.000	.007 -.008
5.000	6.000	.008 -.009
6.000	7.000	.009 -.010

Intraplant INDUSTRIAL

. . . demonstrate their importance wherever established routes for mass movement of materials exist. Specialized functions are reflected in units' designs

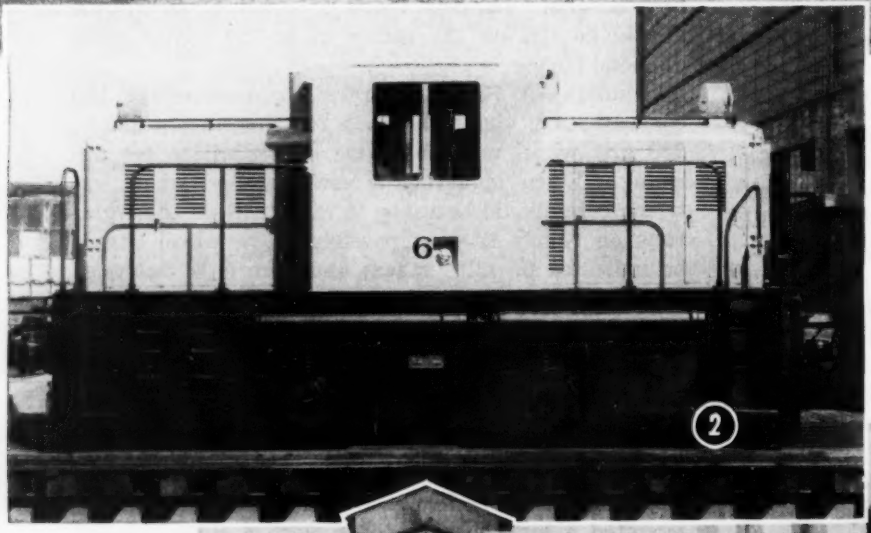
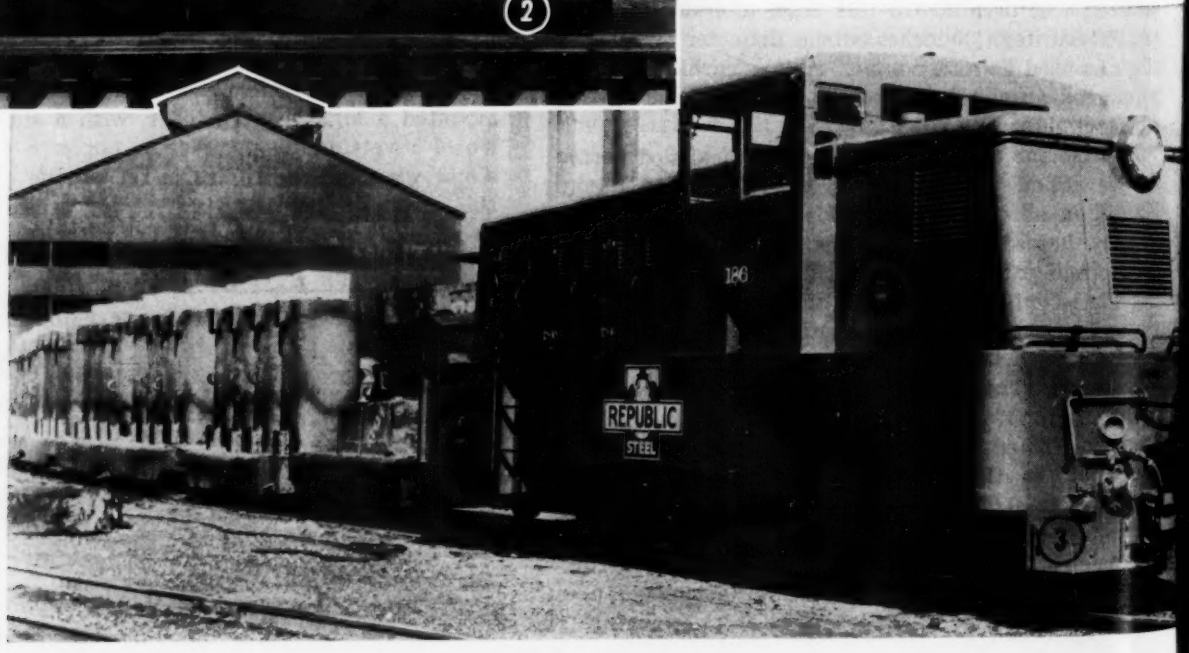


Fig. 1—Making light work of moving slag cars at the Ford Rouge open-hearth building is this Alco-GE 660-hp diesel-electric locomotive

Fig. 2—Whitcomb's 50-ton diesel-electric find wide application in intraplant materials handing

Fig. 3—In service in one of the mills of Republic Steel is this 70-ton Plymouth Flexomotive



LOCOMOTIVES

By HOWARD C. TUTTLE

MATERIALS handling on a grand scale is the role being performed daily by countless intraplant railroads in every industrial country in the world. Like elevators, which handle a larger number of passengers than any other form of transportation and yet are taken for granted, the nation's industrial railroads are accorded little of the recognition rightfully due them in this era when rapid and economical means of moving materials have come to the fore.

Check with the largest manufacturing companies would show virtually 100 per cent of them making use of industrial railroads within their plants; volume production means volume materials inflow and outflow, and to handle this traffic no other means of transportation has yet been devised which is more universally satisfactory than the railroad.

Size No Limit—Dependence on plant railroads, however, doesn't end with the larger plants. Industrial locomotives can be used to advantage wherever haulage routes are sufficiently permanent to warrant the laying of tracks. This may occur in hundreds of large and small companies engaged in the metalworking and metal-producing fields, as well as in such industries as lumbering, mining, construction, etc., where railroad usage is of obvious importance.

Because of the wide scope of industrial locomotive applications, manufacturers of this type of equipment build units ranging in weight from less than three tons to over 130 tons. The only thing these midgets and monsters have in common is that they all operate on tracks.

Short of jet and rocket propulsion, the locomotives make use of all the common propelling mechanisms. There are available units using diesel or gasoline engines, diesel-electric systems, and electric motors which derive their energy from overhead lines, third rails, trailing cables, storage batteries, or any combination of these. There is, in addition, steam locomotion, but this, similarly to the trend in main-line railroading to other forms of engine, is largely being replaced in industrial applications with the other motive forms.

Reflecting the trend from steam to diesel-powered locomotives in industrial plants, a 300-horsepower, 50-ton diesel-electric locomotive is made by Vulcan Iron Works, Wilkes-Barre, Pa. Some of the operating cost factors cited by the company in the modern shift to diesels are savings in fuel, standby losses, maintenance costs.

Some "Tailor-Made"—Among body types there is a noticeable lack of similarity. Specialization has marked plant locomotives perhaps more pronouncedly than any other materials handling method. The reasons for this development are obvious: Initial locomotive cost is large and replacement is infrequent; therefore, units with specialized functions to perform are tailored to the particular job. This fact does not, however, preclude the introduction of mass production methods to the locomotive-building industry. In the smaller locomotive sizes and even in the larger units where their use is similar from plant to plant regardless of the varying nature of products produced in those plants, mass locomotive production is the rule.

An outstanding example of the latter situation is Brookville Locomotive Works, Brookville, Pa. Making direct gear-driven diesel and gasoline-powered industrial locomotives up to 15 tons in weight for use on practically all commercially used track gages, the company's production line is reminiscent of an automobile assembly line. Chassis design has been simplified and cab types are largely standardized to permit economical production. This coupled with the fact the power plant, clutch and transmission are made and furnished in quantity by International Harvester Co. makes possible a moderate price for units which are adaptable to a variety of industrial uses.

Atlas Car & Mfg. Co., Cleveland, on the other hand, concentrates on specials, particularly for use in the steel industry. Tailoring locomotives for the steel industry presents some unique problems because of the nature of the materials handled. And Atlas' solutions are equally unique. For example, a 55-ton lo-

Fig. 4—One of the countless duties performed by this steelworks-owned five-ton Brookville gasoline locomotive is hauling charging boxes

comotive built by the company for use in handling cars at the pouring ladle in a Pittsburgh-area open hearth plant looks more like a monstrous steel box with couplers than like a locomotive. It is remotely controlled and completely armored with heavy plate to protect its mechanism.

Refractories Insulate Unit—Another locomotive the company has built for the steel producing industry is a 9½-ton cable reel unit to move hot billet cars within a Chicago mill. Both the top of the locomotive and a partition between the operator's station and the load are provided with space to be filled with refractory material to protect the engine and the operator from the load's heat.

More commonly seen in iron and steel works' yards are locomotives for moving coke quenching cars to and from the retorts and the quencher. Dubbed "giraffes" because of the long-necked appearance resulting from placing the cab high above the trucks for maximum visibility, these units are equipped with air hoses for operating discharge gates and brakes on the coke quenching car. This type of locomotive is produced by most of the larger specialized-unit producers because of its universal application in this service.

Of the standard and special types of electric industrial locomotives built by Goodman Mfg. Co., Chicago, one of the most unusual is a three-ton unit for use on a number of parallel tracks. Used in conjunction with an overhead monorail crane, the little locomotive is carried to the rail upon which it is to operate, and when positioned on the tracks is automatically disengaged from the lifting hooks and run independently of the crane in places where the crane can not operate. The power cable connected to the crane is played out by an automatic reel on the locomotive as the unit leaves the crane.

Latest types of diesel-electric locomotives built by H. K. Porter Co. Inc., Pittsburgh, for industrial use range in size from 25-ton 150-horsepower to 65-ton 550-horsepower, the smallest having a nominal weight of 50,000 pounds and the largest of 130,000 pounds. The company's 45 and 65 horsepower engines are for switchyard use on normal railroad-size track of 56½-inches. The 25-horsepower locomotive is adaptable to track gages from 36 inches to 56½-inches.

Fills Steel Mills' Needs—Special 50-ton diesel-electrics designed for steel mill intraplant service by Whitcomb Locomotive Co., Rochelle, Ill., have so successfully filled the bill at one large eastern mill that six identical units were recently put into operation. Some of the features making this type locomotive especially useful include wide visibility range and friction snubbers which retard the springs' action so as to reduce jars from rough and uneven tracks. Step wells shielded by steel bumpers provide extra protection for the switchmen on these units.

In the Ford Motor Co.'s Rouge plant, where intraplant locomotives move over 130 miles of track, 17 General Electric diesel-electric locomotives are in operation. These locomotives, which are in use 24 hours a day, seven days a week, have piled up an outstanding record of availability throughout the 1200-acre plant. A heavy-duty requirement consists of supplying blast furnaces on a regular schedule, while a 660-hp Alco-GE unit is used in hauling mold cars loaded with molten steel ingots from the open hearths to the rolling mills.

In the Butler, Pa., plant of Pullman-Standard Car Mfg. Co. two 45-hp GE units are outperforming three steam locomotives previously in use over the plant's 21 miles of track. Substantial fuel savings have also been effected by diesel-electric operation.

Storage Problem Lessened — Another railroad car builder, American Car & Foundry Co., has replaced a 90-ton steam engine with a GE 45-ton, 300-hp diesel-electric which over the last three years ran up an operating time average of 10 hours a day, six days a week, with the locomotive available for service more than 95 per cent of the time. Among other savings accruing from operation of the unit is that of engine-house rental, the diesel-electric being housed in the plant's paint shop.

In steel mill open hearth service, 45-ton Flexomotives manufactured at the Plymouth Locomotive Works division of Fate-Root-Heath Co., Plymouth, O., daily handle scrap tonnage on 2.5 and 3 per cent grades running from 300 (*Please turn to Page* 164)

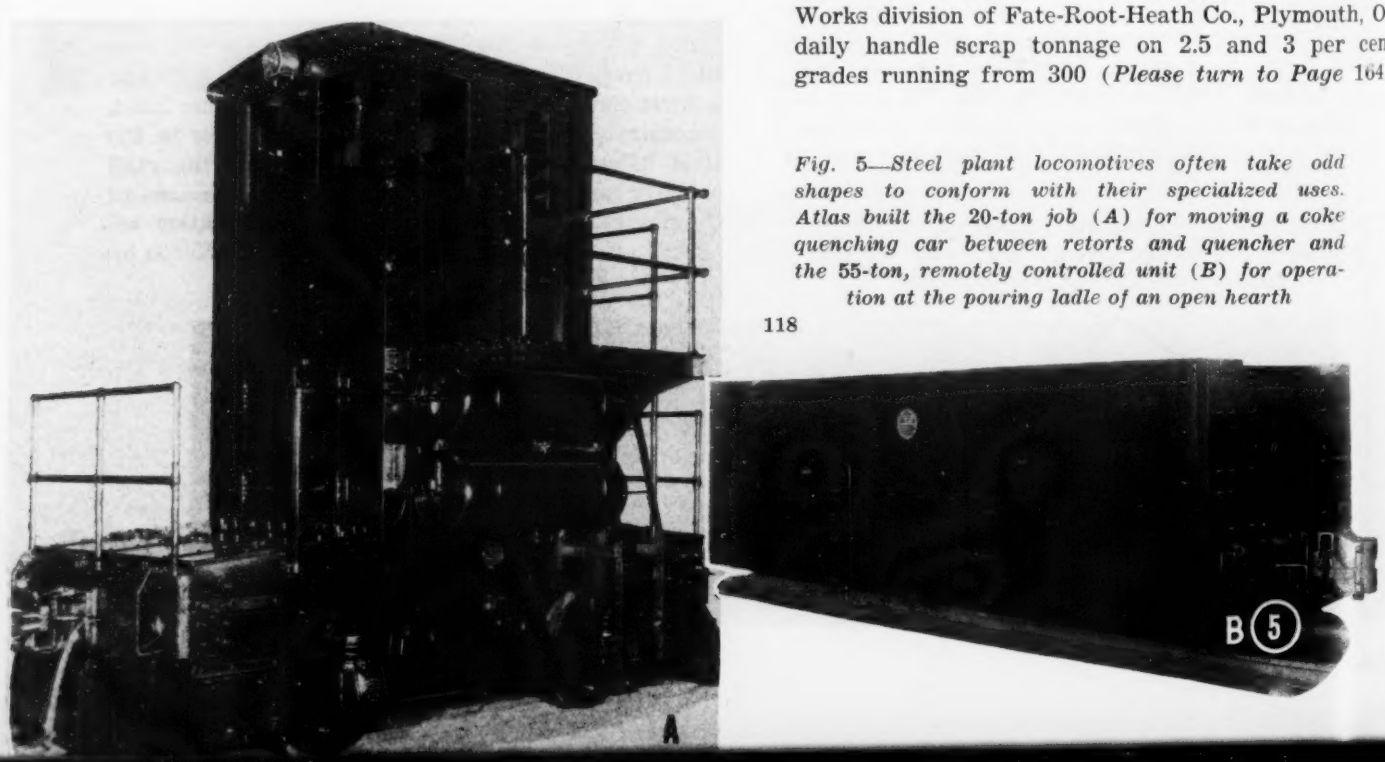


Fig. 5—Steel plant locomotives often take odd shapes to conform with their specialized uses. Atlas built the 20-ton job (A) for moving a coke quenching car between retorts and quencher and the 55-ton, remotely controlled unit (B) for operation at the pouring ladle of an open hearth

Seen and Heard in the Machinery Field

By GUY HUBBARD
Machine Tool Editor

THEY STAND TOGETHER: From November 14 through 17 I was a guest of the National Tool and Die Manufacturers Association at its third annual meeting. This was held in Milwaukee, a city whose highly diversified manufacturing industries have the benefit of the services of some of this country's most progressive contract tool and die shops.

There probably are in the United States between 5000 and 6000 tool and die shops, of which about one-tenth belong to the relatively new national association. These shops are the personification of American private enterprise and of American "small business".

The association into which so many of the progressive members of this industry have entered constitutes a practical, working demonstration of the truth that "small business" need not be either helpless or inarticulate. Through its association this industry is making its voice heard in Washington in no uncertain terms. Also through this association a pattern is being set for business conduct which might well be followed by many other industrial groups. Here are the ten basic principles:

(1) Foundation of business is confidence based on integrity, fair dealing, efficient service and mutual benefit. (2) Reward of business for good service rendered is a fair profit. (3) Equitable consideration and treatment are due customers, employes, management, capital and the public at large. (4) Knowledge —thorough and specific—is essential to lasting success and efficient service. (5) Contracts and promises should be carried out in letter and in spirit. (6) Goods and services should be as represented. (7) Waste in any form, of capital, of labor, or of materials, is intolerable. (8) Controversies should, where possible, be adjusted by voluntary agreement. (9) Unfair competition embraces all acts characterized by unfair practices. (10) Lawful co-operation among those in the industry in support of these principles of business conduct will make them a vital force.

ENGINEERING IS BIG BUSINESS: Back in 1880, when a small group of men interested in co-operative advancement of their profession, met in a publication office in New York and organized the American Society of Mechanical Engineers, they certainly "started something".

On the occasion of the 69th annual meeting of ASME, which at the time of writing this page I am attending at Hotel Pennsylvania in New York, I find that the regular membership of this society now is something like 26,000, augmented by 15,000 student members who are regular members in embryo.

That is a lot of mechanical engineers and this meeting in New York is a lot of meetings, comprising as it does more than 90 sessions spread out over the entire week of November 29. The numerous simultaneous sessions, breakfasts, luncheons and dinners involved, drawing a total registration of something like 5000, tax to the utmost the facilities of the big hotel; the society long since having outgrown the meeting facilities of the headquarters building at 29 West 39th street.

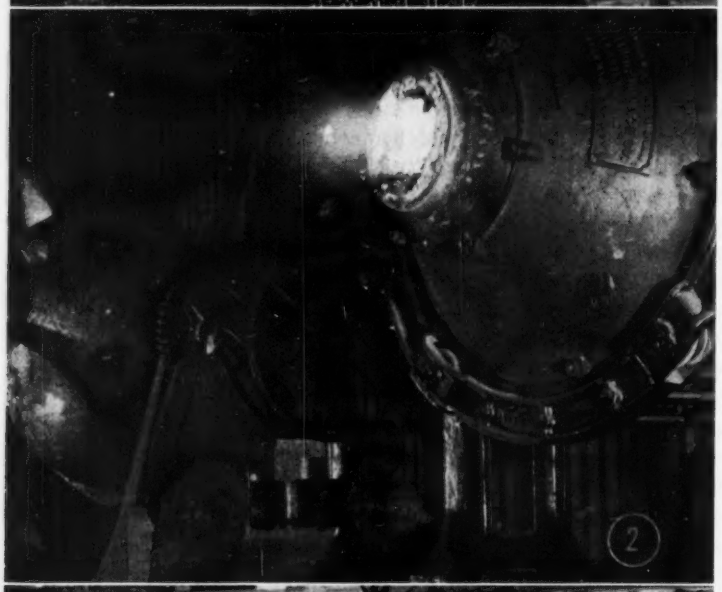
The most amazing thing, however, is the tremendous range of subjects which mechanical engineering, as exemplified by this meeting, now embraces. Many of the founding fathers of ASME were interested in power, but they thought of it primarily in terms of reciprocating steam engines. Little did they realize that the 69th annual meeting would be heavily involved with such things as diesel engines, gas turbines, rocket propulsion and atomic power. Many of the founding fathers also were interested in machine shop practice. Little did they realize that the 69th annual meeting would be dealing with machine tools and production volumes which involve the use of "automatons" to load and unload machines, to move the work from machine to machine and to gage the work and sort it. Little did they realize that the number of speakers at the 69th annual meeting would add up to a grand total of 343, more than the total membership of the society for some length of time after its founding.

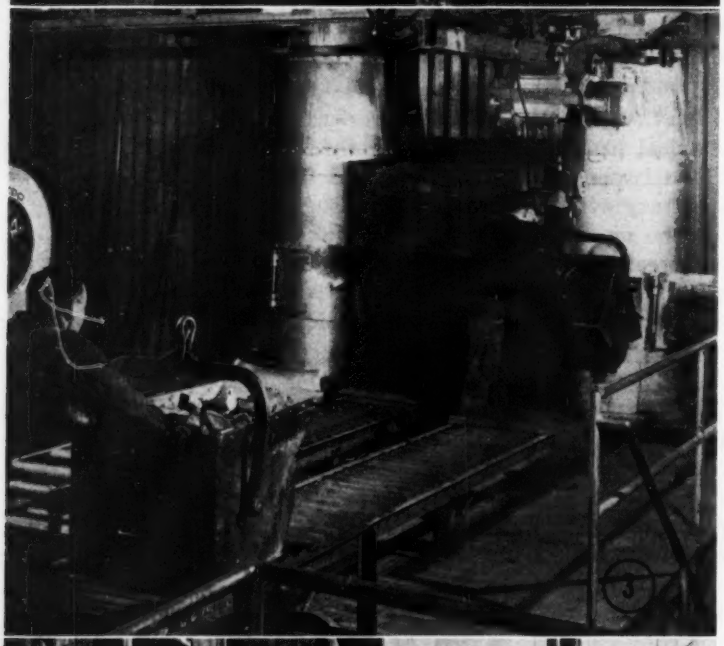
In view of all this the American Society of Mechanical Engineers today certainly is "big business". When I was having breakfast with Col. C. E. Davies, secretary of the society, at the Engineers Club during the meeting, he said, "Excuse me for having you eat breakfast in my office," as he went through a big stack of letters. With responsibilities such as his, such preoccupation is understandable.

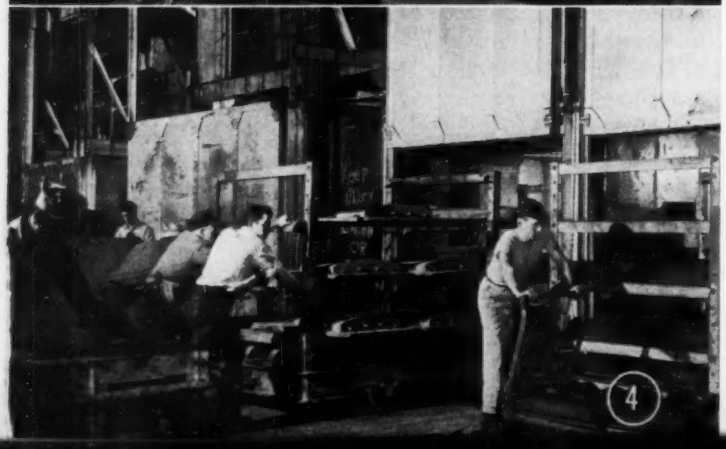
TECHNOLOGICAL STAGNATION: On my way to the annual meeting of ASME in New York, I took occasion to read again a book which was brought to my attention during the machine tool course at Cornell University in July. This book is entitled "Technological Stagnation in Great Britain". It is available from Machinery and Allied Products Institute, 120 South La Salle street, Chicago 3, Ill., at 25 cents per copy.

In the introduction, William J. Kelly, president of MAPI, says, "The value of British experience to our country does not turn on the extent to which Britain could have avoided industrial stagnation, it turns on the extent to which we can avoid it".

There is much food for thought in this book, especially for those who use machine tools and who sell machine tools. What has happened to Great Britain could happen to us. It is up to us to take preventive measures now.







New Nonferrous Foundry

OPENED BY AMERICAN BRAKE SHOE CO.

NATIONAL Bearing division of American Brake Shoe Co. recently announced the opening of its new nonferrous foundry—the newest of Brake Shoe's six postwar plants—at Meadville, Pa. When in full production, the new foundry will greatly exceed the combined productive capacities of four old plants which have been closed. It will provide complete machining facilities which were not available in any of the old plants.

The new plant has a total of 185,245 square feet of floor space or the equivalent of nearly 4½ acres under one roof. This includes a two-story office and employee service building; the main foundry building and machine shop, which measures 735 x 250 feet, and a heating plant housed in a separate unit.

Highly skilled in their trade, the plant's 10 patternmakers make patterns of any size, shape and complexity. The larger sizes are limited only by the facilities which are available for making the actual casting. Sand-handling, a laborious and dirty job in old time foundries, is entirely mechanical at Meadville. Three different systems are installed—one to handle dry sand, one to handle green sand, and an entirely separate system which is used for core sand.

Equipment in the core room includes: 1 jolt roll-over draw machine; 2 jolt-squeeze machines; 3 core-blowers and bench; 1 core-making machine, and a sand-conditioning unit separate from that for the molding department. This unit includes a weighing scale and 2 muller-type mixes. Four rack type ovens and one car type oven—all electronically controlled—handle core baking.

The floor molding section at the Meadville plant is serviced by a sandslinger which is used for medium and large molds of both green and dry sand. The section has a 10 ton and a 5 ton overhead crane, also 2 shake-outs—one for green and one for dry sand. A large mold drying oven is nearby in which molds up to 14 x 16 feet and 12 feet high can be dried. A molding pit measuring 10 x 15 x 20 feet is provided for handling large molds.

The plant has a total (*Please turn to Page* 167)

Fig. 1—*General view of machine shop at Meadville showing diesel engine bearings in foreground*

Fig. 2—*Two oil-fired furnaces in operation in furnace bay*

Fig. 3—*Charging a cupola furnace. At left is shown a new charge being weighed in on portable scales*

Fig. 4—*Inserting cores into core ovens for baking. Flat cores seen on far truck are for blast furnace bosh plates*

The commercial forging industry, like other highly specialized groups, has its full share of jargon. Here are some frequently heard words, defined according to forge shop usage. Tables for the entire series of forging articles appear in this final section

By WALDEMAR NAUJOKS

FUNDAMENTALS OF Forging Practice

Part XIV, concluding the current forging series

Previous articles in the current forging series appeared in the following issues of STEEL:
June 7, p. 100, June 21, p. 98, July 5, p. 76, July 19, p. 99, Aug. 2, p. 98, Aug. 16, p. 94, Aug. 30, p. 59, Sept. 13, p. 100, Sept. 27, p. 89, Oct. 11, p. 101, Oct. 25, p. 78, Nov. 8, p. 96, Nov. 22, p. 68.

MANY words and phrases are used in the commercial forging industry to describe certain actions, shapes, or operations. The meanings given to such words are sometimes different than the ordinary meanings as defined by the dictionary. Such words are defined here according to their use in the commercial forging industry. Where a word is used in some other industry as well as in the commercial forging industry, no attempt has been made to define the word for the other industry.

Acid Steel—Steel made by any process which has been melted in a furnace where the furnace bottom and furnace lining and the slag have acid reactions. Not much acid steel is used in the commercial forging industry for making of forgings.

Alloy—A composition consisting of two or more elements, with the elements ordinarily metals, whereby they are at least partially soluble in each other in the liquid state. Brass, bronze, and Monel metal are alloys.

Alloy Steel—Steel which contains, in addition to the normal elements of iron, carbon, and manganese, one or more elements in sufficient quantity to impart certain additional desirable properties. The small amounts of elements and impurities such as sulphur, silicon, phosphorus, and aluminum which are usually present in any steel, are not considered alloys. If manganese is added to steel in sufficient quantity, it may be considered as an alloy in alloy steel.

Anneal—Heating steel to above its critical range, holding it at that temperature a sufficient length of time for the steel to be heated entirely through its full area, and slowly cooling it through the critical range. Cooling may be performed by cooling the steel down slowly with the furnace, or by burying the steel in dry ashes or lime. Annealing is to remove all working strains and to impart softness to the steel.

Anvil—A block of iron or of steel on which metal is forged. The blacksmith anvil is usually made of iron with a hardened and tempered steel face plate welded on.

Anvil—Base of the forging hammer. The power forging hammer has a suitable groove or slot into which the bottom forging die can be fastened by the use of tapered keys.

Anvil Cap—A block of heat treated steel placed between the anvil of the forging hammer and the forging die to prevent undue wear to the anvil. Also called "sow block."

Austenitic Steel—Steel containing alloys that make the steel nonmagnetic at normal room temperatures and which does not respond to hardening heat treatment with normal heat treating practice. Austenitic structure is found in some of the commercial corrosion resisting steels.

Auxiliary Operations—Operations given to a forging which are in addition to the regular forging operations. Coining, straightening, or forming are some of the auxiliary operations.

Bender—Portion in a set of impression dies where the forging stock is bent or formed so that it will fit to the shape of the final or finishing impression. A separate tool or die for bending forging stock.

Billet—Steel which has been rolled into a round-cornered square or rectangular bar, on which further processing is to be performed, such as rolling it into a round or square bar, or forging it into forged part.

Blast Cleaning—Process for removing scale from forgings, where sand or steel grit is propelled at high velocity at the surface of the work in order to clean the surface.

Blocking—A forging operation which imparts to the forging its general shape, but not the exact or final shape. Blocking is usually followed by forging in final or finishing impression in the set of dies.

Bloom—Metal which has been worked to reduce from the cast ingot, but on which additional work is to be performed, such as reducing it to a billet, or making it into a large forging.

Blow—One stroke of pressure exerted on hot plastic metal to move it nearer the desired shape.

Boss—A small projection on the main body of a forging, extending away from the body. The boss is usually small in comparison to the rest of the forging.

Burnt Steel—Steel which has been heated to a temperature so high that it has been oxidized to the extent where it is no longer good steel and cannot be corrected by heat treatment.

WILLIAMS WISS

TABLE I

Tapers for Draft Angles

Angle in Degrees	Taper in 1"	Angle in Degrees	Taper in 1"	Angle in Degrees	Taper in 1"
½	0.00873	10	0.17633	28	0.53171
1	0.01745	11	0.19438	29	0.55431
1½	0.02618	12	0.21256	30	0.57735
2	0.03492	13	0.23087	31	0.60086
2½	0.04366	14	0.24933	32	0.62487
3	0.05241	15	0.26795	33	0.64941
3½	0.06116	16	0.28674	34	0.67451
4	0.06993	17	0.30573	35	0.70021
4½	0.07870	18	0.32492	36	0.72654
5	0.08749	19	0.34433	37	0.75355
5½	0.09629	20	0.36397	38	0.78128
6	0.10510	21	0.38386	39	0.80978
6½	0.11393	22	0.40403	40	0.83910
7	0.12278	23	0.42447	41	0.86929
7½	0.13165	24	0.44523	42	0.90040
8	0.14054	25	0.46631	43	0.93251
8½	0.14945	26	0.48773	44	0.96569
9	0.15838	27	0.50952	45	1.00000
9½	0.16734				

This table indicates the amount in inches that a point has moved horizontally for each inch of vertical length. For an approximate figure, notice that the standard 7 degree draft angle adds ⅛-inch to each side for every inch of height.

Carbon Steel—Steel in which the main body element is iron and in which the carbon content is the main element to impart the physical properties. Other elements present do not affect the properties appreciably.

Carburize—Adding carbon to the outer surface of low carbon steel by having the steel in contact with suitable material containing carbon at a temperature above the critical range of the steel. The carbon is added to the outer surface of the steel so that when it is hardened and tempered in a later heat treatment, the outer surface will be hard while the core will be softer.

Cast Steel—Steel which is given its final shape by pouring molten steel in a mold which contains the shape desired. Upon cooling, the molten steel becomes solid to the shape in the mold.

Check—Crack in a die impression corner, generally due to the forging pressure getting into a fairly sharp corner to cause the crack. Die blocks too hard for the depth of the die impression have a tendency to check, or develop cracks in impression corners.

Clean—Operation of removing scale from surface of the forging.

Cogging—Working down a cast ingot to reduce its cross-section area and to change the cast structure into a wrought structure, by the use of cogging rolls, a forging hammer, or a forging press.

Coining — Operation of applying heavy squeeze pressure to a relatively small area to obtain a close dimension tolerance on the thickness of the area being coined. Coining is a cold operation usually, unless hot coining is specified.

Coining Dies—Dies in which the coining operation is performed. Dies may be hardened, with flat faces, or they may contain an impression.

Cold Inspection—Cold Inspection is considered, usually, the visual inspection given to forgings after the forging operation, to detect any surface defects that are visible to the eye.

Cold Shut—A cracklike discontinuity in the forging caused in the forging operation where two surfaces of metal have folded against each other, which produces a discontinuity at the point of folding.

Cold Trim—Removing the thin plate of excess metal that has worked out of the die impression between the dies, by a shearing operation in a power press while the forging is at normal room temperature. Thin plate of metal around the perimeter of the forging is termed "flash".

Cold Work—Working metal while it is at normal room temperature, or at least below the temperature of the critical range. Generally performed in forging practice to increase the hardness of alloys that are not subject to hardening by normal heat treating methods, or to gain closer dimensional limits than are practical with hot working.

Complex Alloy—An alloy, generally an alloy steel, containing several alloying elements, in addition to carbon, to impart certain desirable properties to the steel. Complex alloy steels are often especially sensitive to heating, hot working and heat treating, and require considerable care and experience to develop their desirable properties.

Compound Lock—See Lock.

Counter Lock—See Lock.

Critical Range—Range of temperature through which steel must be heated so that physical properties obtainable by heat treatment can be developed. In going through the critical range the crystals of the steel rearrange themselves.

Cutoffs—A pair of cutting edges, either machined in a corner of a pair of die blocks, or inserted in the die blocks, used to cut away the forging from the bar after the finishing blow.

Die—Steel blocks on which forgings are produced. Open dies are flat faced without impressions for use in general smith forging. Closed dies contain impressions of the part to be made as a drop forging. Dies are named to indicate the operation they perform, such as forging dies, trimming dies, coining dies, bending dies, or straightening dies.

Die Shift—Misalignment of dies in which one die is not in true alignment with the other die, after they have been fastened in the forging unit.

Dowel—A small block or piece of steel inserted between the shank of a die and the side of the die holder, to prevent any front to back die shift.

Draft—Taper given the sidewalls of die impressions; used to permit the removal of forging from the dies.

Draft Angle—Angle of taper given to sidewalls of the die impressions. Standard angle of draft for drop forgings is 7 degrees.

Draw—An obsolete term formerly used to indicate tempering. See Temper.

Drop Forging—Forgings made by the use of impression dies and forged in the drop hammer.

Duplex Steel—Steel which has been made by a combination of two steel making processes, such as the Bessemer and Open-hearth, or the Bessemer and Electric Furnace.

Edger—A preliminary forging operation in a set of impression dies, in which the operation is to work metal from the ends of the piece of stock towards the center, so that a better distribution of the stock is obtained for the succeeding forging steps.

Electric Furnace Steel—Steel made in the electric furnace where the heat for melting is obtained through the electric arc. Used for making the highest grades of steels.

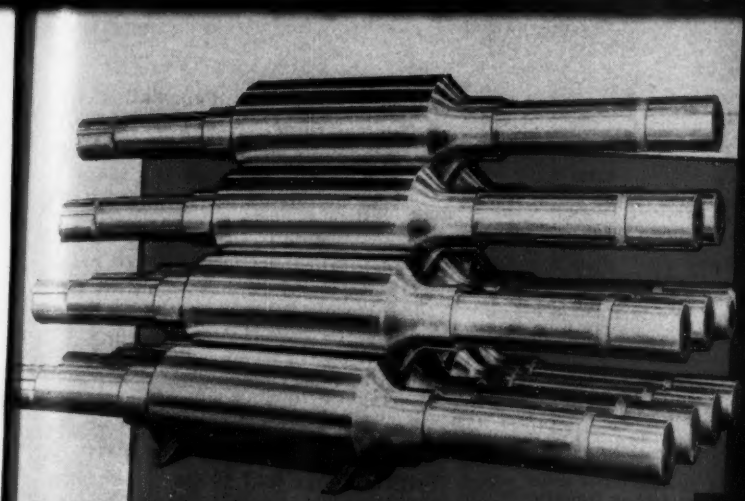
Elongation—Percentage of increase in length of a tensile test specimen after the specimen has been pulled to rupture, as compared to the length before the test. Two fine punch marks, usually 2 inches apart, are placed on the specimen before the test; distance between the marks is measured after the test. Percentage of increase in length is called the "elongation".

FAO or F. A. O.—An abbreviation for "finish all over". It indicates that additional metal must be provided on the forging for the machining operation. Amount of additional

Rolls and Pinions

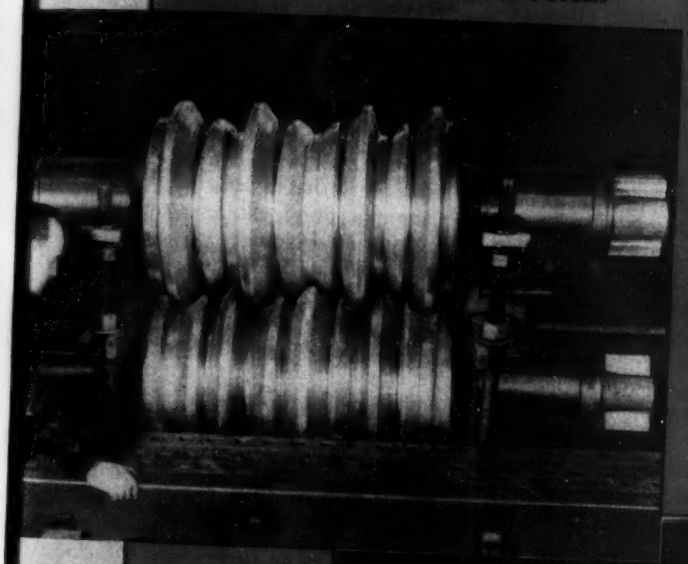
Designed and Built by

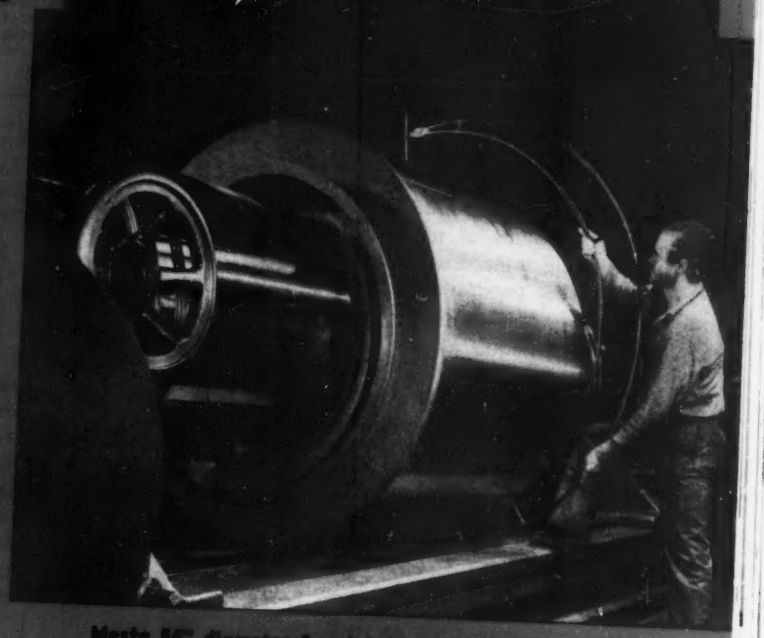
MESTA



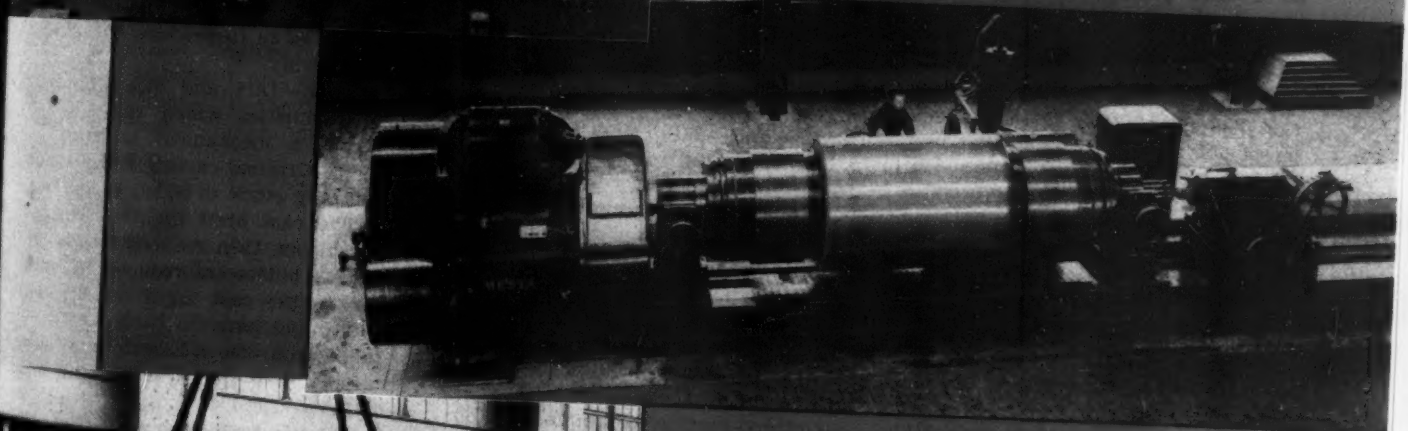
Group of Forged Hardened Electric Steel Working Rolls for Cold Reduction Mills

A pair of Mesta Merchant Mill Rolls for the production of I-Beams

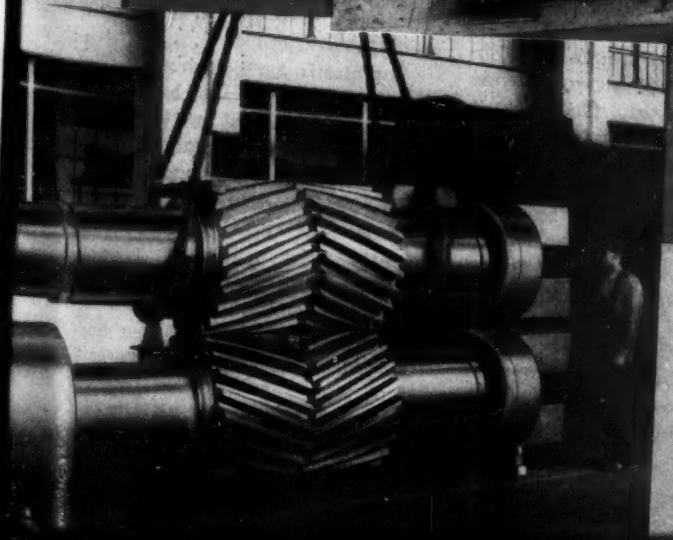




Mesta 56" diameter Special Alloy Cast Steel Backing-Up Roll for a modern high speed Four-High Cold Reduction Mill



Mesta 60" Heavy Duty Traveling Wheel Head Type Roll Grinder



38" x 54" Forged Steel Blooming Mill Pinions
Mesta also produces Cast Steel Mill Pinions with cut or molded teeth

Designers and Builders of Complete Steel Plants

MESTA MACHINE COMPANY

PITTSBURGH, PA.

TABLE II

Maximum Forging Temperatures

2400° F	2350° F	2325° F	2300° F	2275° F
Ingot Iron	1020	1030	1330	1040
1010	1025	1035	1340	1045
1015	1112			6115
	1115			6120
2250° F	**2225° F**	**2200° F**	**2150° F**	**2100° F**
2320	4340	1060	1070	316 SS
2330	5120	1065	302 SS	321 SS
2340	5140	3140	303 SS	420 SS
2350	6135	3150	304 SS	446 SS
2515	6150	3240		
4615	3120	4130		
4620	3130	4140		
4815		5150		
		347 SS		
		416 SS		
2000° F				
440 SS				

The forging temperatures are suggested as maximum for small and medium pieces under good forge heating conditions. Large pieces require generally a somewhat lower forging temperature.

The numbers listed are SAE or AISI steels for carbon and alloy steels. The numbers listed for stainless steels are AISI. Forging temperatures for tool and die steels should be obtained from the tool and die steel makers.

metal added for machining depends upon size of the forging, method used to forge it and shape of the part. Amount of metal allowed for machining is determined by the forger and the machinist.

Fiber — A characteristic of all wrought metals as indicated by its fibrous structure. The structure is developed by elongation of the grains and minute impurities in the composition in the process of rolling, forging, or extruding the cast ingot into the wrought bar.

Fillet—Radius imparted to the inside of two meeting surfaces.

Fin—See Flash.

Flash — Metal in excess of the amount required to fill the die impressions. Excess metal moves out as a thin plate between the dies around the permimeter of the forging at the parting line. Also called fin.

Flash Pan.—Portion of dies around the contour of the impression hollowed out slightly to allow the flash to flow into it.

Flop Forging—A forging in which the bottom die portion and the top die portion of the forging impression are alike, permitting the forging to be turned upside down during the forging operation.

Forging — Metal which has been worked to some definite desired shape by a process of hammering, upsetting or pressing, either hot or cold, or by a combination of these processes. Forging is understood generally to mean hot forging unless otherwise stated.

Forging Quality—A grade of steel superior to the commercial quality, in which surface seams and similar defects have been removed.

Forging Strains—Internal strains in the metal set up by the operation of forging. They are relieved usually by normalizing or annealing.

Forming—Changing the planes of a definite shape without materially changing the cross-section area. Forming usually consists of bending the original shape to some other position.

Free Cutting—Metals or alloys which have had some element or elements added to aid in the machining.

Fullering—A preliminary forging operation incorporated in a set of dies to reduce the cross-section area between the ends of the forging stock.

Gate—A portion of the drop forging dies which has been cut away to permit a short connection between the portion of the forging stock in the die impression and the portion used for the tong hold, or the forging bar.

Gathering Stock—Any operation whereby the cross-section of a portion of stock is increased above the original size.

German Die—A loose or temporary die placed on a flat die to aid in making a rough shape. Usually used in smith work.

Grain—Crystal in metal which forms the structure.

Grain Flow—Direction of flow lines in forgings.

Grain Size—Size of the crystals in metal when measured with a standard.

Guide—Portion of a forging hammer or a press which guides the up and down motion of the ram.

Gutter—Portion of impression die which has been relieved to provide for the excess metal (flash) as it passes through the flash pan.

Hand Forging—See Smith Forging.

Handling Holes—Holes drilled in opposite ends of the die block to permit handling of the die block by the use of a crane or bar.

Hardening—Operation of heating steel to above its critical range and following this a rapid cooling of the steel in a quench in order to develop hardness.

Hardness—Generally, the resistance of metal to deformation by mechanical force. Also refers to the hardness numbers obtained in testing for hardness by any of the several hardness tests.

Heat—Amount of forging stock placed in the batch type forge heating furnace, to be heated up at one time. Also, temperature of the metal, or the operation of increasing the temperature of the metal for heat treating or forging purposes.

Heat Treat—Any operation or operations of heating steel to above its critical range and cooling it in order to develop desired physical properties.

Hot Inspection—Inspection of forgings during the process of forging them, to detect visual defects.

Hot Short—Brittleness in metal at certain ranges of temperature above the normal room temperature.

Hot Stamp—Impressing markings in the forging while the forging is in the heated state. Also the forming or bending of heated plate.

Hot Trim—Removing flash or excess metal from the forging in a trimming press while the forging is in the heated state.

Hot Work—Mechanical working of metal while it is above its critical range or its recrystallization point.

Hot Working Steel—Steel which is designed primarily for uses in dies and tools in which the metal being worked is in the heated state.

Hub—A boss or disk which is in the center of the forging and forms a part of the body of the forging.

Impression—Portion of the dies machined so as to produce the shape of the forging.

Inclusion—Dirt and other nonmetallic impurities which may be in metal as a mechanical mixture.

Ingot—Original casting from which the forging stock is rolled or extruded. The cast steel ingot is cogged into a bloom, then reduced into a billet; some billets are reduced to bars. In brass, the cast ingot is extruded into wrought bars.

Ingot Iron—Open-hearth iron substantially free from carbon and impurities.

Inhibitor—An addition to the acid pickling solution which retards the action of the acid on the metal by depositing a molecular film on the surface of the bare metal, permitting the acid to loosen the scale.

Insert—A piece of steel which is tightly fixed in a die. The insert may be used to fill a cavity, to replace a portion of the die with a grade of steel that is better for wear at that point, or a small die with the impression fastened to a master die. The insert die contains a better grade

of steel to make the forging impression wear longer.

Inspection—Process of checking a forging for possible defects or deviations from the standards given on the drawing or in the instructions. Chemical inspection checks the composition of the metal. Physical inspection checks the tensile and other physical properties. Hardness inspection is the determination of the relative hardness of the metal as against a standard hardness when tested by one of the several hardness testing methods. Cold inspection is a visual inspection of the forgings after they have cooled off to normal room temperature. Hot inspection is a visual inspection of the forgings during the time they are in the heated state.

Iron—The basic element in steel. Also, a press operation used to obtain a more exact alignment of the various sections or parts of a forging, or to obtain a smoother surface condition.

Key—A wedge used to fasten dies in the forging equipment.

Lap—A surface defect in the forging caused by the folding of metal in a thin plate on the surface.

Layout—Transferring drawing or sketch dimensions to templates or dies for use in sinking die impressions. Also checking a forging or a lead cast to determine whether its dimensions are in accord with those given on the drawing or on the model.

Lead Cast—A reproduction in lead, or a lead alloy, of the die impression, obtained by clamping the two dies together in alignment and pouring the molten die metal into the finishing or final impression. Also called lead proof.

Lead Proof—See Lead Cast.

Liner—A thin strip of steel used to take up space between the die shanks and the die seats. Liners are used to shift the dies slightly so as to obtain good alignment.

Lock—Where the parting plane on the die faces is in two or more levels. A compound lock is found where the parting plane is in several levels. A counterlock is a lock placed in the dies to offset or balance a tendency to dieshift. Deep slope of a lock is balanced by a deep slope in the opposite direction.

Machinability — Relative ease or difficulty of removing metal by machining when compared to the ease of machining some standard metal.

Machine Forging — Forging made on the forging machine, or upsetter.

Macrostructure—Structure of metal as revealed on a polished and etched surface either by eye or through a glass under low power magnification of not more than ten diameter power.

TABLE III
Weights of Forging Metals

Name	Wgt. Lbs/Cu. In.	Ratio—Wgt. to Wgt. of Carbon Steel
Iron, wrought and ingot	0.285	100.5
Steel, carbon and low alloy	0.284	100.0
Steel, 18-8 stainless	0.285	100.5
Steel, 13% chromium stainless	0.283	99.5
Steel, 18-4-1 high speed	0.321	113.0
Copper	0.325	114.5
Brass, forging	0.310	109.0
Monel Metal	0.320	113.0
Aluminum alloy, forging	0.103	35.8

Master Block—A die block primarily designed to make use of insert dies.

Match Lines—Two flat widths at right angles to each other and adjacent to the die face from which impression dimensions are taken and related to each other.

Mechanical Work—Subjecting metal to plastic flow in order to change its shape or physical properties.

Microstructure—Structure and internal condition of the metal as revealed on a polished and etched surface when magnified to high magnifications of over ten diameters. Normal magnifications for the study of microstructure are 50 diameters, 100 diameters, 500 diameters, and 1000 diameters.

Mismatch—A pair of dies not in true alignment.

Nitride—Producing surface hardness on suitable iron-base alloys by heating below the critical range when in contact with some suitable gas containing nitrogen, such as ammonia gas.

Normalize—Removing forging and working strains in steel by heating it to above the critical range of the steel, holding it at that temperature so it is uniform throughout the steel, and then cooling of the steel in still air.

Open-Hearth Steel—Steel made by the open-hearth process whereby oxygen is passed over molten metal in order to remove the desired amount of carbon and other impurities.

Overheated Steel—Steel which has been subjected to such high temperatures as to produce coarse grains but without destroying the steel, as in burning. Coarse grain structure in many steels can be reduced by a suitable heat treatment.

Parting Line—Dividing plane between the two of a pair of dies used in forging metal.

Planish—Rolling a forging, or some portion of a forging, in a pair of dies to remove the trim line or to obtain close tolerances. Generally a cold press or hammer operation, but performed at low temperature at times.

Press Forging—Forging made by a mechanical or a hydraulic press.

Punch—Movable die in a power press or a forging machine. Also the operation of shearing out a slug in a forging to produce a hole.

Punchout Rigging—Parts required to fasten the punch and plates to the power press.

Quench—Rapid cooling of metal, usually steel, from above the critical range, in some quenching medium. Brine, water, oil and molten quenching salts are some of the quenching media used.

Ram—Moving part of a drop hammer or a power press to which one of the dies is fastened, and through which the forging pressure is exerted. Also, to force in or force out holding keys and wedges used to fasten dies.

Red Shortness—Metal which has a brittle range at some part of the red heat and cannot be worked in that part of the red range.

Reducing Atmosphere—Combustion in a furnace where there is no excess oxygen or a slight deficiency of oxygen. Also termed "wet fire".

Reduction of Area—Percentage of decrease of cross section area of a tensile test specimen after rupture.

Restrike—Striking a trimmed impression die forging, such as a drop forging, to align the forging after trimming and remove any possible bending.

Restrike on Draw—Restriking a forging on the tempering temperature of a heat treatment to produce alignment of sections.

Roller—A preparatory operation in a set of drop forging dies, designed to move bar forging stock into various forms of revolution so that the metal is distributed suitably for further forging in drop forging dies.

Rolling Edger—An edger and roller combined for the distribution of metal for further forging in the drop forging dies.

Ruptured Metal—Also called ruptured fiber structure. Forging stock that has been severely worked so as to cause broken fibers in the metal.

(*Please turn to Page* 158)

NEW *Life-Line* MOTORS NOW AVAILABLE

WESTINGHOUSE NOW OFFERS *IMMEDIATE DELIVERY* ON *STANDARD* LIFE-LINE MOTORS . . . IN RATINGS FOR 60% OF INDUSTRY'S REQUIREMENTS

To meet industry's urgent need for more—and better—motors, Westinghouse embarked two years ago on the biggest engineering and manufacturing program ever undertaken in this field.

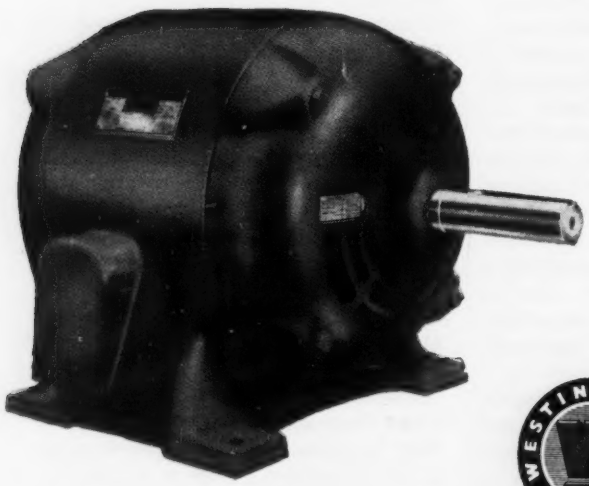
Industrial buyers were surveyed to find the improvements most desired in existing standard motors. These improvements were incorporated, for the first time, in a single motor—the Life-Line—*a motor designed, from scratch, to user specifications.*

To build the Life-Line motor, a complete new plant was purchased, tooled and equipped from the ground up, with machines and new techniques never used before to manufacture motors.

Today, we announce the attainment of our first objective. The new Life-Line motor is now available from stock, in standard types from 1 to 15 hp.

This objective was selected as of first importance, since 60% of standard, integral horsepower motors required by industrial users fall in this classification. Motor types included in stock are described on the opposite page. On "near-standard" motors, also described, short deliveries are available in these sizes.

Improved deliveries on special types and larger ratings will be the subject of future announcements, as quickly as increased output makes them possible. Watch for them . . . phone your orders to your nearest Westinghouse representative. Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa. J-21497



Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Life-Line motors

FROM 1 to 15 HP* FROM STOCK

WHAT IS MEANT BY "STANDARD" MOTORS

"Standard" motors include drip-proof, splash-proof, totally-enclosed, fan-cooled and some totally-enclosed, non-ventilated complete motors, ball-bearing type, having standard electrical characteristics (220/440 volt, 2 or 3-phase, 50 or 60-cycle, standard speed torque and time-temperature characteristics).

Available from stock in ratings indicated below. Very short delivery on any standard non-stock rating in these frame sizes.

TYPES INCLUDED AS "NEAR-STANDARD" MOTORS

"Near-standard" motors are those with minor modifications, which include such items as double shaft extensions, NEMA standard B and C flanges, special No. 1 insulation, round frame, conduit box opposite standard, squeeze connectors instead of conduit box, TENV motors, partial motors, 50-cycle, 40° C. rise open motors, etc.

Short delivery in frame sizes listed below.

Life-Line A-C, Single-Phase, 60-Cycle, 110-220-Volt, Heavy-Duty Type CAP Capacitor-Start, Induction-Run Motors

HP	RPM	FRAME	VOLTS	IN STOCK
1	1750	203	220	✓
1½	1750	[illegible]		

Life-Line A-C, 3-Phase, 60-Cycle, Squirrel-Cage Motors

HP	RPM			ENCLOSURE TYPES IN STOCK

*REMEMBER?

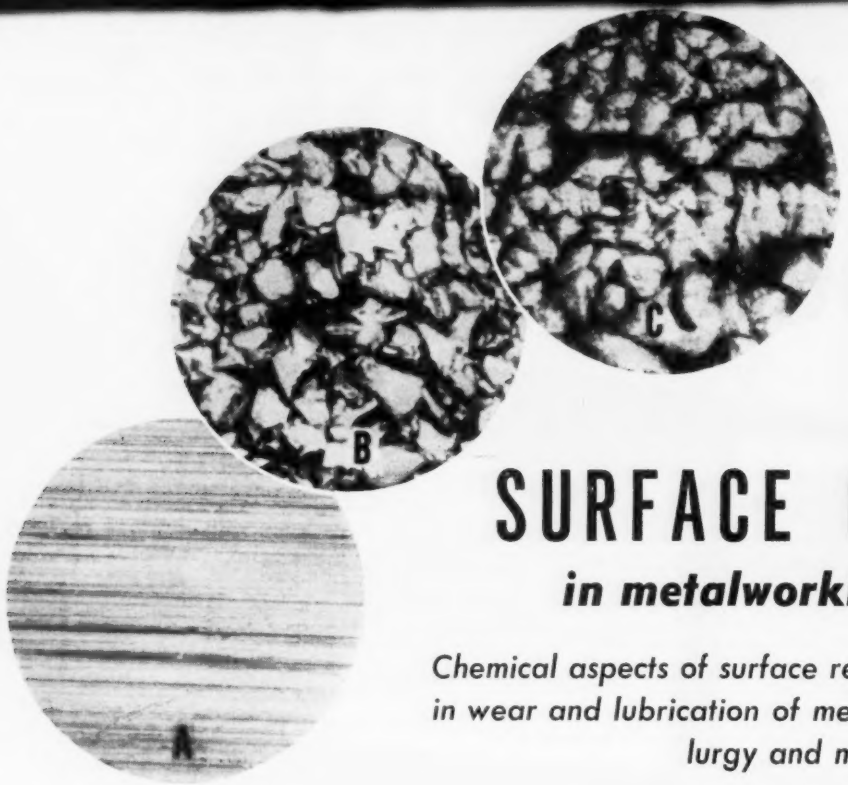
This announcement was published last spring—And now...

STOCK to 6 WEEKS Delivery

ON STANDARD 20 TO 75 HP MOTORS 445 FRAME AND SMALLER

Here's good news for motor users. Westinghouse squirrel-cage motors . . . open or splashproof, NEMA designs B and C, frames 364 through 445 . . . can now be obtained in 6 weeks *or less.* Many are in stock. Even the larger sizes, up to 200-300 hp, now have reduced shipping schedules—the shortest since 1942.

Your local Westinghouse representative will give you specific information on the motors you need . . . in answer to your phone call.



Photomicrographs of surfaces phosphate treated to produce pores in the metal surface to hold oil and increase lubrication. (A) Finished steel surface before treatment; (B) similar surface with a commercial phosphating process; (C) surface after removal of chemical coating. Courtesy Parker Rust-Proof Co.

SURFACE CHEMISTRY

in metalworking operations

Chemical aspects of surface reactions play an important part in wear and lubrication of metal parts and in powder metallurgy and metal coatings

CHEMICAL and physical nature of a metallic surface has a marked effect on many present-day metalworking operations. Importance of the principles of surface chemistry in determining the behavior of metals under various conditions of treatment was brought out in the recent Cleveland Symposium on Surface Chemistry, sponsored jointly by Cleveland sections of the American Chemical Society, Electrochemical Society, and American Institute of Chemical Engineers.

It is generally recognized that metal surface is a complex of crystal faces, edges, corners, boundaries, and disturbed layers. Thus, the surface properties are a composite of these many types of structures, and the properties of these structures must be understood in order to understand the behavior of the metal surface. Surface chemistry is playing an increasingly important role in a variety of operations involving friction, wear, and corrosion of metal surfaces, and in other basic processes such as phosphate coating, powder metallurgy and organic finishes.

Surface Reactions — According to Allan T. Gwathmey, University of Virginia, keynote speaker of the symposium, an ordinary metal surface consists of many crystals, randomly arranged and exposing many different types of structure, such as different crystal faces, edges and corners. Since each type of structure has a different arrangement of atoms, it would be expected that the property of a surface would differ with the type of crystal face exposed. Measurements made on polycrystalline materials, therefore, are composite quantities and give only limited information about the mechanism of the reaction.

A special method of study using large single crystals of metals was developed in the school of chemistry of the University of Virginia whereby the individual crystal faces may be identified and the rates of reaction on each face may be measured. Crystals are first grown in the form of a rod, ½ to 1 inch in diameter, from which either spheres exposing all possible faces, or slices exposing only one particular face may be cut. The strained layer is removed and a smooth surface is obtained by mechanical polishing followed by electrolytic polishing.

Specimens are generally heated in hydrogen at 500° in order to remove further strains and any oxide formed on the surface. Influence of crystal face in about ten surface processes with thirteen different metals, including copper, nickel, iron, and silver, was studied in the University of Virginia laboratories. Rates of reaction, in general, have been found to differ greatly with crystal face, indicating that the different faces of any one metal behave as if they were different metals. This fact, it was emphasized by Dr. Gwathmey, has both basic and industrial significance.

Color Pattern Forms—When copper crystals in the form of spheres are heated in air at a temperature of about 250°, a very striking interference color pattern forms as a result of the different thicknesses of oxide on the different crystal faces. Using the colors as a measure of thickness, the rate of oxidation on one face was found to be as much as five times that on another. Patterns which form are highly sensitive to the nature of the reacting materials. There is a characteristic pattern for the reaction of each gas with each metal, although there are generally certain common features among patterns.

When copper is deposited electrolytically on a single crystal of copper from a copper sulphate—sulphuric acid solution at a current density of 2 ma. per sq. cm., the metal is deposited more rapidly on some faces than on others and the sphere is converted into a polyhedron at the end of 450 hours. With an intermediate current density of 20 ma. per sq. cm., polycrystals form on some faces while the deposit is monocrystalline on others. At higher current densities, the deposit soon becomes polycrystalline over the entire surface. Some addition agents simply serve to modify the relative deposition on the different faces. When a metal of one kind is deposited on a crystal of another, the first metal will deposit in the monocrystalline form only on certain preferred faces of the second metal.

In the case of corrosion or etching in liquids, according to Dr. Gwathmey, one face will be more rapidly attacked than the other. Although this effect has been long known, as

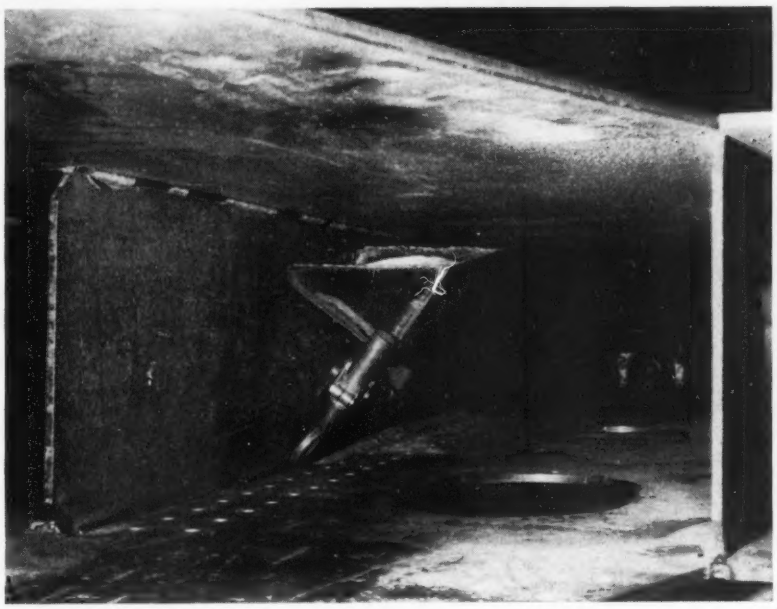
shown by its use in the preparation of metallographic specimens for examination under the microscope, surprisingly little consideration has been given to this important effect in studies of corrosion. Another interesting effect with liquids is the preferred wetting of some faces of copper, nickel, and iron by stearic acid, when the crystals are immersed in the liquid, and then raised above the level of the liquid, and allowed to stand in the air for a few seconds. No such preferred wetting takes place when an atmosphere of hydrogen is maintained above the liquid.

Catalytic Reaction—Two interesting effects take place during the catalytic reaction of many gases on metal crystals. When oxygen and hydrogen are allowed to react on the surface of a copper crystal at a measured gas temperature of about 400° C, the surface of the sphere rearranges to form a striking pattern as a result of the formation of many small facets on certain faces. Some faces will remain relatively smooth and unaffected. In addition to these striking rearrangements of the surface, the rate of the catalytic reaction has been found to differ greatly with the face exposed.

In some cases when a second metal is deposited on a crystal of another metal, this second metal in the form of a promoter may serve to control the rearrangement and the relative rates of the catalytic reaction on the different faces. In one striking case, the decomposition of carbon monoxide on a crystal of nickel, carbon forms so rapidly on some faces that it can subsequently be wiped from the surface with a tissue while no carbon can be detected on other face with the aid of a microscope.

Other processes are found to differ greatly with the crystal face exposed at the surface. For example, the dry static friction between copper has been found to differ fourfold depending on the crystal face exposed at the surface, and wear between lubricated metal parts differs both with crystal face and the nature of the surrounding atmosphere.

In considering the surface of metals in an engine, it should be kept in mind that solids, liquids, and gases are all simultaneously involved. The chemical interaction between these three forms of matter plays a more important role than is generally appreciated, and undoubtedly many of the difficulties commonly attributed to mechanical causes have their origin in chemical processes. If the nature of the crystalline metal is kept in mind, the great importance of the atomic spacing in the surface becomes apparent.



GIRDER SEAMS WELDED: A 7-foot extension nozzle on a Unionmelt welding head was required to weld ⅜ x 12 inch diaphragm plates to ½-inch thick side plates of a deep box girder for a 60-ton gantry type dock crane. Shown is the small hopper on end of the nozzle extension to distribute the granular material which, after fusing during welding, is cracked off to expose the dense weld. The type U unit, made by Linde Air Products Co., New York, is mounted on a carriage supported by a short track to provide a 7 foot travel

Strong Adherence—It was pointed out by Dr. Gwathmey that experiments on wear between two dry polycrystalline surfaces of copper have shown that very strong adherence was obtained between moving parts when the oxide was removed. It was postulated that the strong adherence between oxide-free surfaces must result from the same forces which cause solidification and give rise to a definite crystal structure in the solid state.

Thus, lack of adhesion between oxide-covered metal surfaces may be due to the following causes: Absorbed gas may prevent good adhesion, but this effect is expected to be small. Tensile strength of the oxide is probably considerably less than that of the metal, but is not sufficiently small to explain the poor adherence. The oxide consists of two different kinds of atoms, and the chances of matching positions for a continuous lattice, when the surfaces are placed together, are less than the chances with metal surfaces. Failure to match positions would prevent strong adhesion. Since the oxide formed from a given amount of metal has a greater volume than the metal, the oxide is strained, and, after an appreciable thickness is attained, probably becomes disengaged from the metal.

Phosphate Coating—Application of surface chemical reactions to the phosphate coating of metals was discussed by R. C. Gibson, director of research, Parker Rust-Proof Co., Detroit, wherein it was pointed out that such processes for metal treatment are essentially surface corrosion reactions, to the extent that metal surfaces are specifically corroded, controlling the conditions to give a particular type of corrosion resistant surface film. Earliest commercial use made of phosphate coatings was the protection of iron and steel from corrosion. Conversion of metal surfaces to an insoluble phosphate coating acts as a physical barrier to exclude moisture from the metal surface. Protective value of such coatings thus depends upon their continuity and for this reason thickness and density are more important than any other factors.

It was pointed out in discussing the surface chemical reactions involved, that coatings having a wide range of thicknesses and properties can be produced depending upon the method of cleaning of the surface prior to treatment, adjustment in solution concentration, and time of

(*Please turn to Page* 144)

New High-Speed ROD MILL

. . . utilizes electronic speed regulation

This automatic speed regulation system is making possible better and more uniform coils and the rod mill reel operator is being relegated to the role of a "button pusher"

LACLEDE Steel Co. at its Alton, Ill. plant, is operating the latest type of rod mill. First production and maintenance figures give every indication that this mill may become a valuable yardstick in future rod mill planning. It features several innovations made possible by the rapidly advancing "know-how" in the relatively new field of electronics.

Designed and built by Morgan Construction Co. of Worcester, Mass., the mill delivers two rods simultaneously from 19 stands set in tandem. Hot billets up to 2-½-inch square and 40 feet in length are fed into the roughing train to be delivered as finished rods in preselected sizes ranging from No. 5 to ¾-inch. Nine direct current motors, totaling 3900-horsepower, and three 1000-kilowatt generators provide a flexible driving arrangement. Four pouring reels with their speed automatically matched to the finishing stands furnish smooth uniform coils for the conveyor system.

Compactness of the mill is shown in Fig. 1. Stands are much closer together than in previous installations. Fig. 2 of the motor room shows that stands are approaching individual drive which is also a departure from previous practice. With stands extremely close together, it is necessary to maintain precise speed

By G. M. HARVEY
Electrical Engineer
Laclede Steel Co.
Alton, Ill.
and
D. M. ALLISON
Consulting and Application Engineer
Westinghouse Electric Corp.
St. Louis

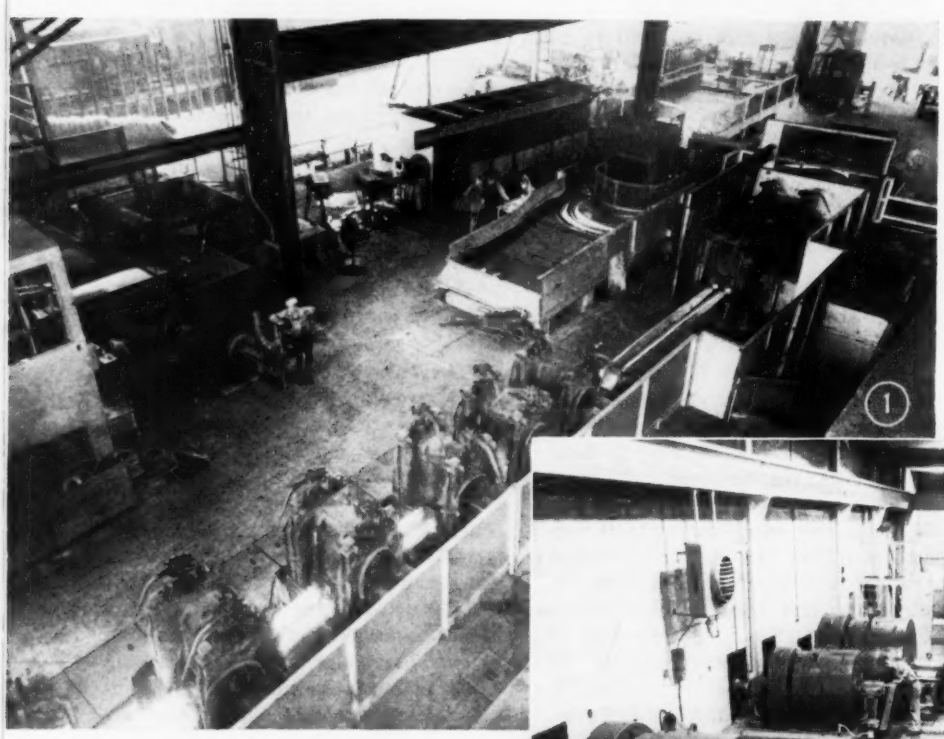
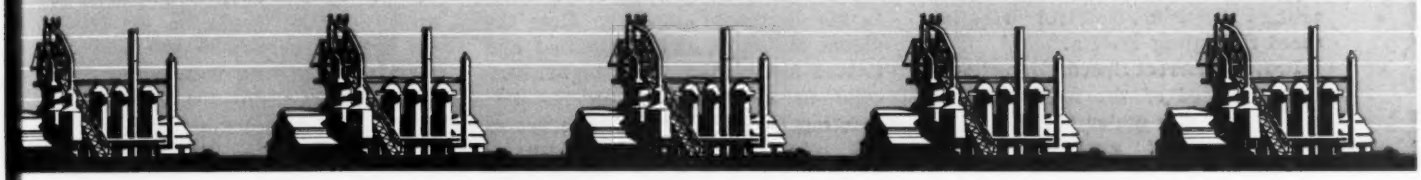


Fig. 1—Portion of roughing train is shown with No. 1 stand in left foreground. Hot metal is delivered from 40-foot furnace to left of photo. Rods continue on to looping stands in right center and are finished in the screen covered rolls above

Fig. 2—Motor room showing main motors and controls. Electrostatic air cleaners provide a dirt free atmosphere. Tendency toward individual drive motors is indicated by units at left which range in size from 200 to 600 horsepower. Three 1000 kilowatt generators are located in center of room with motor and generator control panels at right

5

NEW BLAST FURNACES COMPLETED BY McKEE IN 1948



DURING 1948 Arthur G. McKee & Company completed engineering and construction of five new blast furnaces with a combined annual capacity in excess of two million net tons.

These projects included stoves, cast houses, stock houses and gas cleaning equipment.

McKEE

ARTHUR G. McKEE & COMPANY

Engineers and Contractors • Established 1905

2300 Chester Avenue • Cleveland, Ohio

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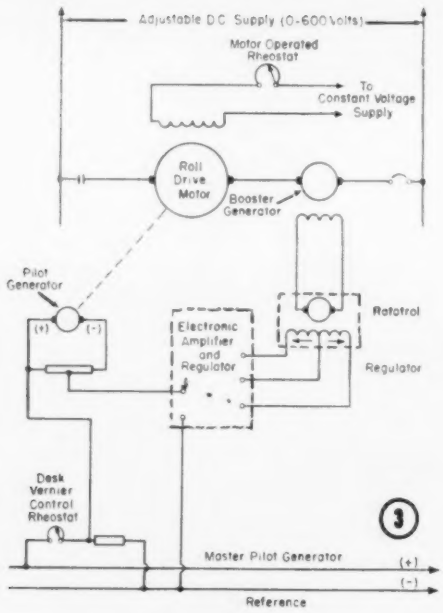
DESIGN, ENGINEERING AND CONSTRUCTION FOR THE IRON AND STEEL AND PETROLEUM REFINING INDUSTRIES

UNDIVIDED RESPONSIBILITY IN ONE



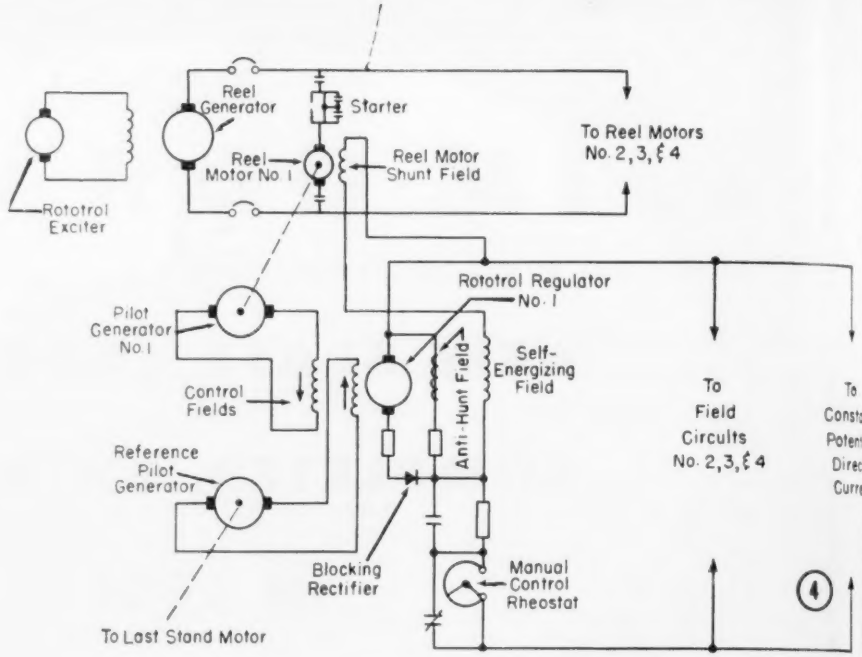


Fig. 3—Schematic presentation of speed control of motors in roughing train

Fig. 4—Schematic presentation of reel motor control

regulation between adjacent rolls. This regulation called for careful study and precise application of equipment. It was decided to add fly-wheel effect to the motors and try for instantaneous speed correction. The near instantaneous speed response is accomplished by a quick acting Electronic-Rototrol rotating speed regulating system.

Provide Correct Speed Correction— Overall speed of the mill is set by a reference bus under the control of a master pilot generator. Each driving motor is equipped with a pilot generator and any change in motor speed is quickly transmitted to the electronic amplifer. Here the signal is immediately amplified and passed along at a much higher voltage to a quick-response Rototrol rotating excited booster. The use of the rotating combination regulator makes possible a speed correction of the right magnitude and direction almost before the motor itself is aware of the need for correction. Six driving motors in the roughing train are equipped with series boosters and are connected as shown in Fig. 3. The electronic regulator is designed for a sensitivity for linear response of plus or minus 0.2 of a volt with an available amplification of 450 to 500. Minute speed changes instantly cause a correction action in the motor armature circuit.

Three motors in the looping and finishing stands have the same arrangement except that correction in speed is obtained by bucking or boosting shunt field current with a direct acting rotating regulator in the field circuit. Each driving motor in the mill is equipped with an individual pilot generator, amplifier, rotating regulator and booster combination.

During the first weeks of actual mill operation, it became apparent that speed response system was performing to the highest of expectation. Design of each motor drive was based on 1-½ per cent speed change with 100 per cent impact load on the rolls. It is possible to start two billets simultaneously through the mill and

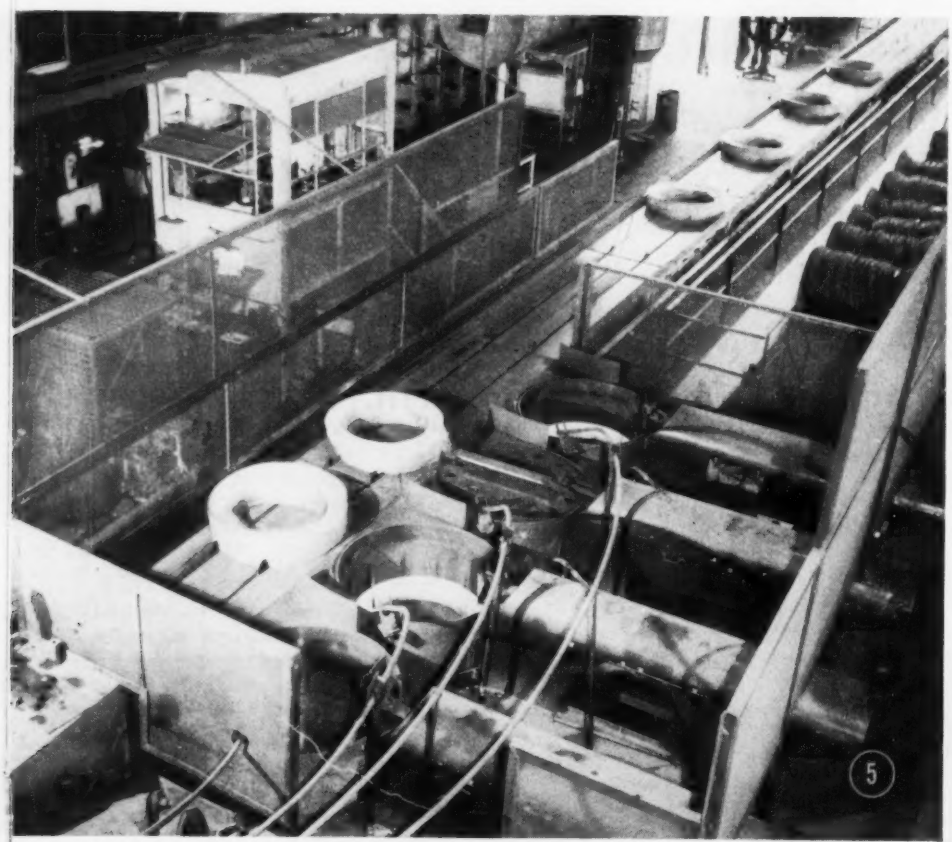
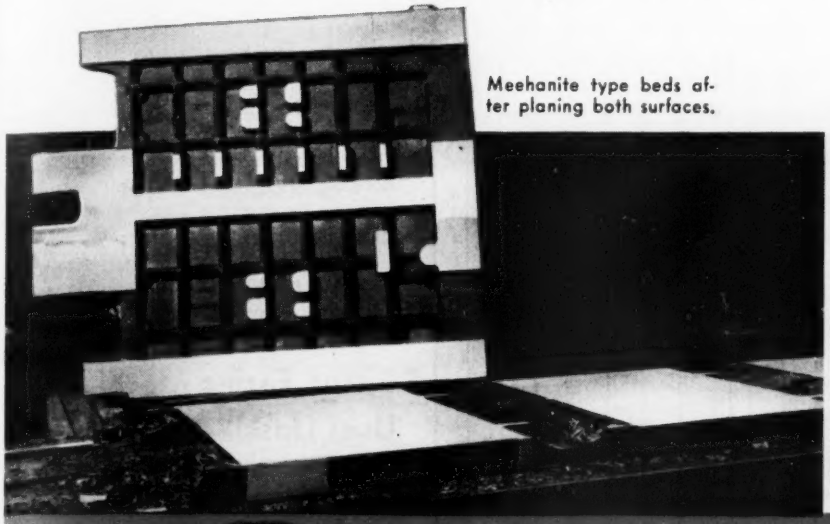
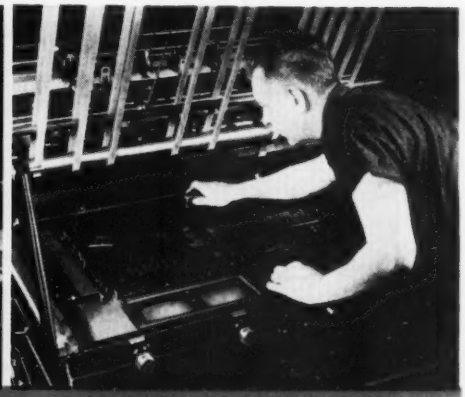


Fig. 5—These four automatically-controlled pouring reels furnish rods to conveyor system. Two reels in continuous pouring operation and automatic stripping and pushout features deliver coils at a constant rate

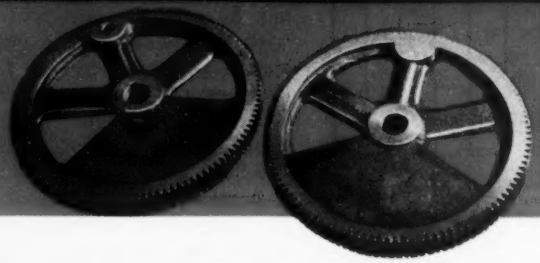
Builders of PRECISION Machinery Specify MEEHANITE® Castings



Meehanite type beds after planing both surfaces.



Printing type is set and locked on to the top surface of the Meehanite type bed. Any irregularity or imperfection in this bed would affect vital printing quality.



Two typical Meehanite printing press gears.

MODERN printing presses are truly *precision* machines. To give added assurance of this quality to their equipment, the American Type Founders Corporation, Elizabeth, New Jersey, use a variety of Meehanite castings.

Of particular interest and genuinely important from the standpoint of smooth, dependable and precise operation are type beds and various gears. The beds require an extremely close-grained and flawless material, one which will maintain its dimensional accuracy and at the same time be freely machinable. Meehanite castings provide these qualities.

Meehanite printing press gears offer the required high vibration absorption capacity combined with adequate strength, toughness, machinability and uniformity.

Manufacturers of Meehanite castings utilize the scientific Meehanite production controls and processes which enable them to meet these and other rigid specifications of casting users whose objective is to produce quality products with maximum efficiency.

Write for our booklet entitled "The Role of Meehanite Metal Castings in Engineering Production."

MEEHANITE FOUNDRIES

American Brake Shoe Co.	Mahwah, New Jersey
The American Laundry Machinery Co.	Rochester, New York
Atlas Foundry Co.	Detroit, Michigan
Banner Iron Works	St. Louis, Missouri
Barnett Foundry & Machine Co.	Irvington, New Jersey
E. W. Bliss Co.	Hastings, Mich. and Toledo, O.
Builders Iron Foundry Inc.	Providence, R. I.
H. W. Butterworth & Sons Co.	Bethayres, Pennsylvania
Continental Gin Co.	Birmingham, Alabama
The Cooper-Bessemer Corp.	Mt. Vernon, Ohio and Grove City, Pa.
Crawford & Doherty Foundry Co.	Portland, Oregon
Farrel-Birmingham Co., Inc.	Ansonia, Connecticut
Florence Pipe Foundry & Machine Co.	Florence, New Jersey
Fulton Foundry & Machine Co., Inc.	Cleveland, Ohio
General Foundry & Manufacturing Co.	Flint, Michigan
Greenlee Foundry Co.	Chicago, Illinois
The Hamilton Foundry & Machine Co.	Hamilton, Ohio
Johnstone Foundries, Inc.	Grove City, Pennsylvania
Kanawha Manufacturing Co.	Charleston, West Virginia
Koehring Co.	Milwaukee, Wisconsin
Lincoln Foundry Corp.	Los Angeles, California
The Henry Perkins Co.	Bridgewater, Massachusetts
Pohlman Foundry Co., Inc.	Buffalo, New York
Rosedale Foundry & Machine Co.	Pittsburgh, Pennsylvania
Ross-Meehan Foundries	Chattanooga, Tennessee
Shenango-Penn Mold Co.	Dover, Ohio
Standard Foundry Co.	Worcester, Massachusetts
The Stearns-Roger Manufacturing Co.	Denver, Colorado
Traylor Engineering & Mfg. Co.	Allentown, Pennsylvania
Valley Iron Works, Inc.	St. Paul, Minnesota
Vulcan Foundry Co.	Oakland, California
Warren Foundry & Pipe Corporation	Phillipsburg, New Jersey
Washington Machinery & Supply Co.	Spokane, Washington
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"This advertisement sponsored by foundries listed above."

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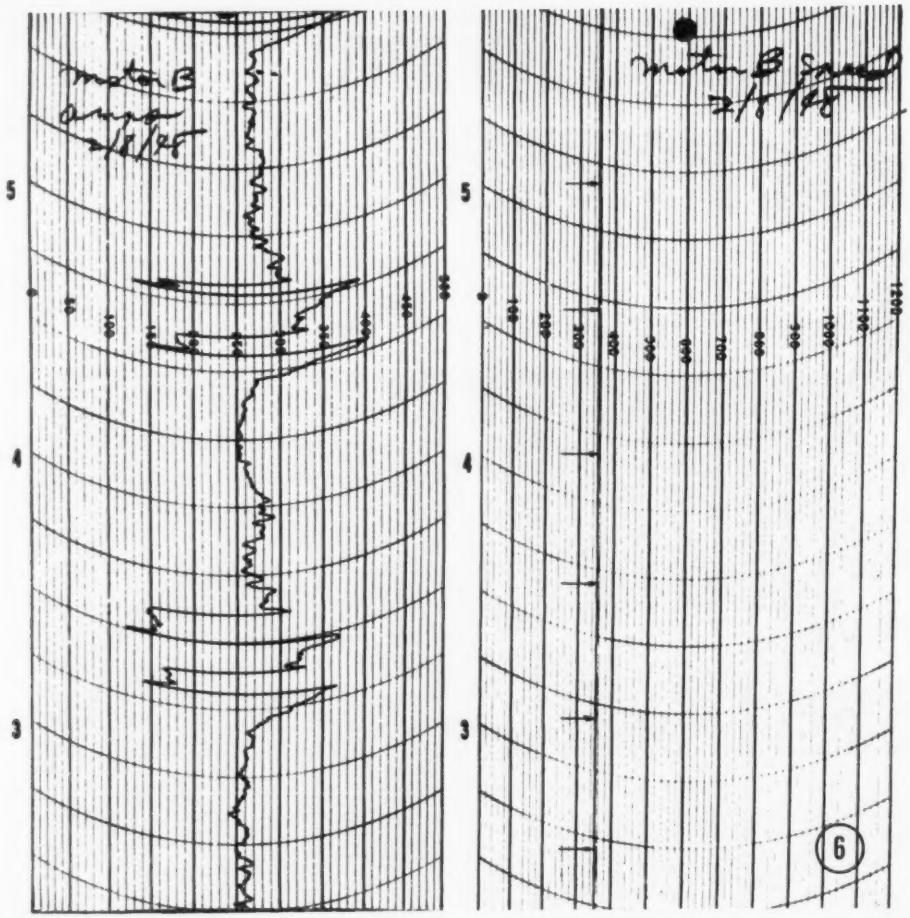

Fig. 6—Typical high-speed graphic charts of motor speed and load for an individually driven stand. Chart indicates load savings due to bar entering or leaving stand as well as effect of cold ends. Note excellence of speed regulation even during these wide load swings

speed changes will be imperceptible. On stands driven by individual motors, where impact loading exceeds full load of the motor, there is only the slightest indication of drop in speed. Charts, typical of which are two shown in Fig. 6, taken from the various speed meters show a continuous straight line practically without indication of loading points.

Reel Operator Becomes "Button Pusher"—Finished coils are wound and handled with a minimum of direct attention. A pilot generator, driven by the finishing stand motor, produces a voltage that is proportional to rod speed through the final stand. This voltage cue is fed to the intelligence field of four quick acting Rototrol rotating regulators. The regulators balance this voltage cue against reel motor speeds as indicated by pilot generators driven by the reel motors and results in a smooth flowing strand of rod on the reel. Although the reel operator is now relegated to the role of "button pusher", this automatic speed regulation is making possible better and more uniform coils. Two continuous rods flowing at 3900 feet per minute can be reeled, stripped, and pushed onto the conveyor merely by an occasional pushbutton operation. Fig. 4 is a schematic representation of the reel motor control. Any unbalance in the two pilot generator output voltages is fed directly to the regulator to give accurate speed matching.

Realizing that the older conventional method of direct current voltage regulation would not be adequate, applications were made of rotating regulators. To insure a steady source of direct current voltage for mill power, the three 1000-kilowatt generators are controlled by rotating exciter systems. Flexibility and a high degree of steady state and dynamic amplification is obtained. Main generators may be operated individually or in parellel, as each generator is controlled by a separate regulator exciter system. When operating in parallel, all three generators are under the control of a single regulator which, in turn, feeds individual exciters for the generators. This gives the mill operator an easily controlled adjustable source of direct current supply. Reel motors are assured a constant and steady supply of voltage from a direct current generator with its excitation system similar in pattern to the large main generator regulator. This type of quick acting regulation for the reel motor generator is necessary if coils are to be consistent.

From a production standpoint, the mill has an impressive record. Since the first pilot bars were processed with very little difficulty, it was decided that actual production could be scheduled immediately. Only minor electrical and mechanical adjustments were found necessary and these were accomplished between shifts. Continuous production has resulted since the initial start-up. These innovations in rod mill construction are proving to be great strides toward better and faster rod production.

Piston Facing Machine Uses Unskilled Operator

Automotive pistons are center drilled and faced at the rate of 444 per hour at 85 per cent efficiency with a special purpose machine, designed and built by Snyder Tool & Engineering Co., Detroit, for operation by an unskilled operator. The operation consists of center drilling the head end of the piston and facing a portion of the piston head, these surfaces then serving as locating points for succeeding operations.

Machine is equipped with two standard, hydraulically actuated slide Snyder units carrying single spindle heads used for the center drilling operation. Facing slides and tool blocks are mounted on the face of the machine column and are hydraulically actuated in horizontal position. Two rotating four-jawed chucks are mounted in the machine base directly beneath the centering spindles, two of the four jaws having radial locators.

Each cross slide carrying tool blocks has independent hydraulic feed systems which permits the operator to load and unload a piston in one side of the machine while the opposite side is machining a piston. Spindles and chucks are driven through V-belts and sheaves which are easily changed to alter the speed of each. Feed rates of center drill and facing slides are adjustable through feed control valves and centering spindles.

—o—

Contained in the 30th anniversary issue of *Production Road*, published by Twin Disc Clutch Co., Racine, Wis., is a factual and pictorial history of the company's development from its origin to the present time.

LETTERS *to the Editors...*

Hardness Tester

You published in STEEL of July 26, 1948, "Methods and Instruments for Hardness Testing" by A. M. White. We are interested in the Tukon hardness testing and beg you to give us the address of the firm manufacturing this instrument.

La Nationale S. A. Geneve
(Suisse).
Geneva, Switzerland

Manufacturer of the Tukon hardness tester is Wilson Mechanical Instrument Co. Inc., 377 Concord Ave., New York, N. Y.—The Editors

Dry Plating

In the Engineering News section on page 91 of the Nov. 15, 1948 issue of STEEL is a brief article describing a "dry plating process" as developed by Commonwealth Engineering Co., Dayton, O. Will you furnish us, attention of the writer, the street address in Dayton of the company so that we can contact them to obtain more detailed and specific information on this plating process?

G. L. LaBar, Supervisor
Tool & Methods Department
Bendix-Westinghouse Automotive
Air Brake Co.
Elyria, O.

Address of the Commonwealth Engineering Co. is 1771 Springfield Street, Dayton 3, O.—The Editors

STEEL in the Classroom

This is a request for information on the availability of a technical article appearing in STEEL. If available, a copy of the following article would be useful for instructural purposes: "Applied X-Ray Metallography", by Norman P. Goss, STEEL, Volume 123, July 5 and September 6, 1948.

R. R. Nash, Instructor
Department of Metallurgical
Engineering
Rensselaer Polytechnic Institute
Troy, N. Y.

Copies of the two issues of STEEL are being sent.—The Editors

Corrosion Proof Material

In the September 13 issue of STEEL on page 119 there is a mention of "Heresite", a rust and corrosion proof process or material. Can you give us the address of the producers?

F. C. Stephens
Enzinger Union Corp.
Angola, N. Y.

Manufacturer of the material is Heresite & Chemical Co., Manitowoc, Wis. Our sources say it is a phenol-formaldehyde supplied in liquid form and may be applied by spraying or dipping. The company states that it is resistant to most acids and all but the strongest alkalies. Its maximum continuous service temperature is 400°F.—The Editors

Reprints Available

Your article in STEEL, "Cutting Tool and Die Materials" is very useful to many. It is the type of information that is very helpful in heat treating plants that handle all types of steel. Have you on hand, or do you intend to make reprints of this article? If so, I would like to obtain several copies.

Arnold P. Seasholtz
Seasholtz Metallurgical Service
Lancaster, Pa.

Yes, reprints have been made and are now available. They are available from STEEL's Readers Service Department for $1.00 per copy.—The Editors

Tear Sheets

We are interested in receiving an article which appeared in the Oct. 7, and Oct. 14, 1946 issues of STEEL magazine. The article, which appeared in two parts, was entitled, "Removing Dissolved Gases from Molten Metal". We would appreciate your sending us a tear sheet of the above.

N. Anton, President
Amperex Electronic Corp.
Brooklyn, N. Y.

Tear Sheets are now in the hands of the Post Office Department.—The Editors

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Paper Compares Physical, Mechanical Damping

Investigation of the cause of discrepancy between the results of mechanical and physical methods of measuring damping capacity in torsional vibration was reported in a paper by G. A. Cottell, research engineer of British Engine, Boiler & Electrical Insurance Co. Ltd., K. M. Entwistle of the department of metallurgy, University of Manchester and Prof. F. C. Thompson, professor of metallurgy, also of the university. In the paper, presented at the recent meeting of the British Institute of Metals, they stated that in the case of a machine of the Foppl-Pertz type, the energy loss in the machine itself may, when treating a material of low damping capacity such as duralumin, amount to about 500 or more times the intrinsic energy dissipation of the specimen.

All the major sources of loss were isolated and complete redesign of an existing machine reduced the measured damping to twice the lowest values measured by the physical method. Use of a solid of revolution in place of the usual rectangular bar as the oscillating inertia was found to be essential. The air friction energy loss over the surface of the oscillating wheel was measured in order to determine the air loss correction to be applied to the test results.

Damping capacity of duralumin as measured with this machine was found to be in excellent agreement with the lowest determinations by physical methods. This investigation confirms that the physical and mechanical methods are in fact measuring the same property and shows that (at least for aluminum alloys) results of the same order can be obtained by the two methods, provided that the apparatus is designed correctly.

New Transformer Standards Issued by ASA

Greatly increased demand for electrical equipment is expected to give added significance to the new edition of the American standards for transformers, regulators and reactors, published by American Standards Association Inc., New York. The 1948 edition is the result of long co-operation between manufacturer and user groups who have been working together for many years to bring about an effective codification of transformer practice.

Basis for the document is formed by the standard practices originally presented in publications of the American Institute of Electrical Engineers, the National Electrical Manufacturers Association and the Edison Electric Institute. The new standards provide a common yardstick by which users may evaluate bids for new equipment, thus offering a fair basis for competition among all producers of transformers, states the A. S. A. Their use will result in increased manufacturing efficiency and output.

Eighteen standards, bound separately but collated together in a stiff paper cover with screw fasteners, include a general document on terminology, providing definitions for terms used in all the standards, one on general requirements, seven standards for the different types of transformers, three test codes and six guides for loading and operation.

Inorganic Finishes

(*Concluded from Page* 114)

and normally cannot be dyed. They do not compare in wear resistance or thickness with those produced by electrochemical means. They are very suitable, however, for increasing the corrosion resistance of aluminum alloys when the installation or use of electrochemical methods is not warranted.

Oxide Coatings on Steel — Oxide coatings are produced on steel in three general ways. One method involves simple oxidation in the air or heat tinting. This method is used for cheap objects because the coating is thin. Oxide coatings produced are a blue-black color. Another method involves immersing the object in a fused oxidizing agent bath containing, for example, nitrate or nitrite with the addition of one or more accelerating materials. These baths normally operate at relatively high temperatures, ranging from 600 to 900° F.

Third method of producing oxide coatings, now the one most generally used, involves the application of the coating in aqueous alkaline oxidizing solutions operated from 260 to 320° F. There are various proprietary solutions on the market for this purpose. For example, the Ebonol "S" process of Enthone Inc., operates in the temperature range from 285 to 290° F. The process produces ferroferric oxide coatings with thicknesses varying from 0.00005 to 0.0001-inch.

Oxide coatings do not give very significant protection against corrosion. This is because any particles on the surface not made of iron will not be coated and as a result continuous oxide coatings are never produced. Main function of the coating is to give some slight increase in corrosion protection but a considerable increase in beauty or other functional value. An object made of steel that has been blackened is usually more attractive than one unblackened. For this reason, many manufacturers are using such blackening processes. For example washing machine gear parts and other component parts not plated are blackened to give a finished look, and in such cases the corrosion protection is afforded by an oil, wax, or clear lacquer.

Some objects that are being blackened by this method include guns, revolvers, toys, buttons, typewriter parts and accessories, camera parts, for example shutters, and radio parts. One new use for blackening has been on bobby pins. These were formerly coated with an enamel; it was difficult to enamel them completely without leaving a heavy drop of enamel that would interfere with sliding of the pin over the hair.

Oxide Coatings on Copper—There are several methods for producing oxide coatings on copper. These include an electrochemical process in an alkaline solution and a hot method formerly used by the button industry, which involves decomposition of copper nitrate. Most generally used method employs alkaline chlorite solutions. This method produces adherent, jet black corrosion-resisting cupric oxide coatings by simple chemical means.

Work can be blackened in baskets or in barrels as well as by hanging on hooks and wires. Copper alloys containing 65 per cent or more copper can be blackened. The coatings have very high adhesion, and when applied and finished in a certain manner, beautiful glossy deep black finishes can be obtained.

Black oxide finishes are used on thousands of objects. A few articles being blackened include compacts, lipstick cases, clock faces, watch and clock dials, instruments of all types, machine accessories, camera parts, dress ornaments and nameplates.

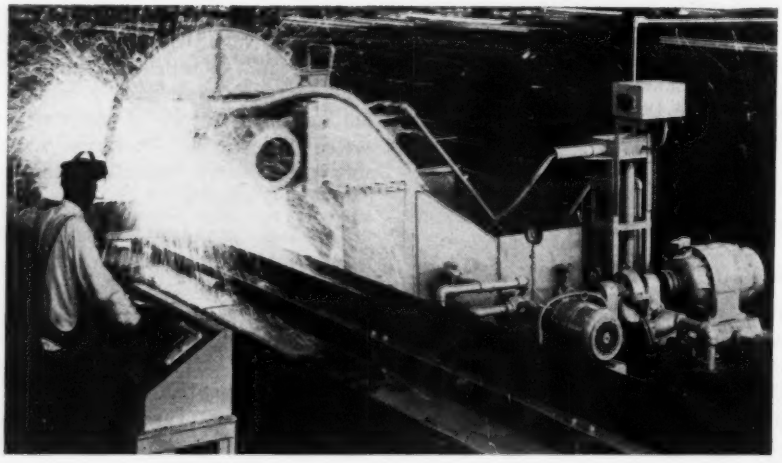
Oxide Coatings on Zinc — Direct oxidation of zinc to an oxide can be done electrochemically. However, the most generally used method of applying oxide coatings to zinc involves the use of special molybdate solutions which deposit adherent black coatings on zinc alloys. This type of treatment for zinc has resulted in marked saving in industry for the black finishing of many types of objects where good corrosion resistance is also wanted. For example, the typewriter industry desires a black finish on key levers. At the present time many manufacturers are zinc-plating to get the corrosion resistance of zinc and are blackening the zinc by means of the molybdate type process. Zinc plated levers are blackened because the white plate does not blend well with the machine.

Another saving in production is accomplished in the same manner by the button industry. Buttons were formerly made of steel and were enameled or japanned. The enamel was difficult to remove from the hole of the button and an unsatisfactory job frequently resulted. Buttons can now be made of zinc-plated steel or they can be made of steel and plated afterwards. Following this, they can be quickly blackened with the application of a uniform film of black.

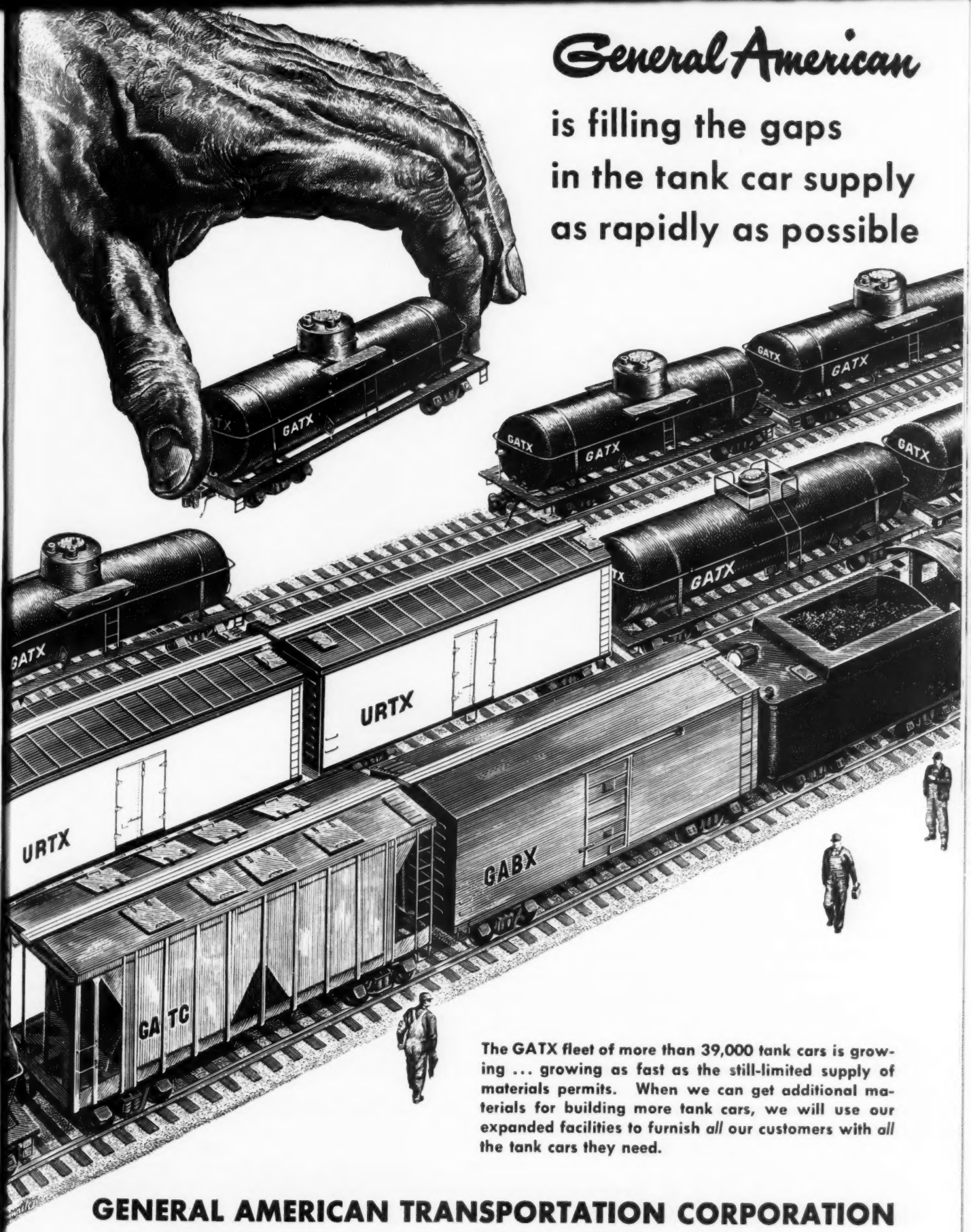
Blackening of zinc base die castings is increasing to a large extent. Castings can be buffed to a high luster and glossy black finishes can be produced.

—o—

Available from the U. S. Government Printing Office, Washington 25, D. C., is 323-page technical paper 652, "Analyses of Kentucky Coals". Prepared by the Bureau of Mines, it is one of a series on American coals, and sells for 40 cents.



CLEAN, SQUARE CUTS—FAST: Chicago warehouse of United States Steel Supply Co. received the first high speed friction saw to be installed in various warehouses of the company. Making clean cuts across heavy sections, the saw eliminates excessive burring and has a maximum forward speed when making a cut of 13 feet per minute. It features remotely controlled, electrically operated feed and take-off rolls which facilitate handling. Saw blade is a 60 inch steel disk which revolves with a peripheral speed of about 320 miles per hour



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is filling the gaps in the tank car supply as rapidly as possible

The GATX fleet of more than 39,000 tank cars is growing ... growing as fast as the still-limited supply of materials permits. When we can get additional materials for building more tank cars, we will use our expanded facilities to furnish *all* our customers with *all* the tank cars they need.

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When you insist on the best in materials and workmanship, you'll make a hit with customers every time. Take the wire that holds the bristles so securely on NACO Brushes, for example.

Keystone BRUSH WIRE is specified by the manufacturer because its attractive silver-brite galvanized finish does not chip or peel when tightly twisted. Also, this quality wire has the proper ductility for accurate forming.

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The Keystone organization takes pride in the fact that Keystone Wire is a recognized factor in the sound construction of NACO Brushes.

**The National Brush Company*
Aurora, Illinois

KEYSTONE
MUSIC SPRING WIRE

SPECIAL ANALYSIS WIRE
for all industrial purposes

KEYSTONE STEEL & WIRE CO., Peoria 7, Ill.

Surface Chemistry

(*Continued from Page* 133)

treatment. A build-up of 0.00015 to 0.0003-inch of phosphate coating usually results from Parkerizing operations, which is the trade name given to one type of commercial phosphating process. Since no electric current is used in the surface reaction and the formation of the coating is solely dependent upon the phosphating solution contacting the metal surface makes possible the production of uniform coatings on irregularly shaped articles, in recessed areas, and on threaded surfaces with facility equal to that on flat surfaces. The phosphate coating of nonferrous metals such as zinc, aluminum, and their alloys is increasing in commercial use to prevent corrosion and increase the adhesion of applied paint coatings over such surfaces.

Complex Equations — Equations representing the phosphate surface reaction are complex. However, from what is known to occur in practice, simple chemical equations may be employed, using as an example a phosphating solution prepared from primary zinc phosphate, which is perhaps the most widely used phosphating solution. Surface chemistry of the reactions involved may be expressed as shown below:

$$3\,Zn(H_2PO_4)_2 + Fe + O \longrightarrow \underset{\text{(iron surface)}}{} Zn_3(PO_4)_2 + FeHPO_4 + 3\,H_3PO_4 + H_2O$$

COATING

$$4\,Fe(H_2PO_4)_2 + O_2 \longrightarrow 4\,FePO_4 + 4\,H_3PO_4 + 2\,H_2O$$

SLUDGE

Use of metal accelerators and suitable oxidizing agents in the phosphating solution, it was brought out by Gibson, has expedited the phosphate coating formation and made possible the production of paint base coatings on metals within 2 to 5 minutes. Combining spray application with such accelerated phosphate solutions containing an oxidizing agent further reduced the coating time to as low as 2 to 10 seconds. However, the heavy corrosion preventive type coatings require longer time of treatment.

Affinity of heavy phosphate coatings for oil, wax or color is one of their most valuable characteristics and is utilized in practice to further enhance their corrosion resistance. Another recent development is the production of phosphate coatings in color, produced by immersion of the phosphate coated articles in a color bath at boiling temperature for 2 to 6 minutes, followed by rinsing.

Drawing Aid—According to infor-

TOCCO-Hardening Pitman arms. Photo courtesy Kaiser-Frazer Corporation.

with TOCCO* Induction Heating

Your product may bear no resemblance to the steering gear Pitman arm shown here, but if it has to be hardened, annealed, brazed, soldered or forged, TOCCO can probably brighten your production picture, too—saving you time and money.

● Progressive engineers at The Kaiser-Frazer Willow Run plant have adopted speedy automatic TOCCO Induction Heating for surface hardening Pitman arms. The ball end is heated to 1600° F. in seven seconds—then quenched automatically for 4 seconds. The operation is fast, neat, fool-proof.

Material is S.A.E. 1045 steel, forged. Balls are hardened to 55-60 R.C., to a uniform depth of ⅛". The remainder of the part is unaffected—retains its original ductile structure. Automatic TOCCO assures that metallurgical results are identical, every part the same, one or a million.

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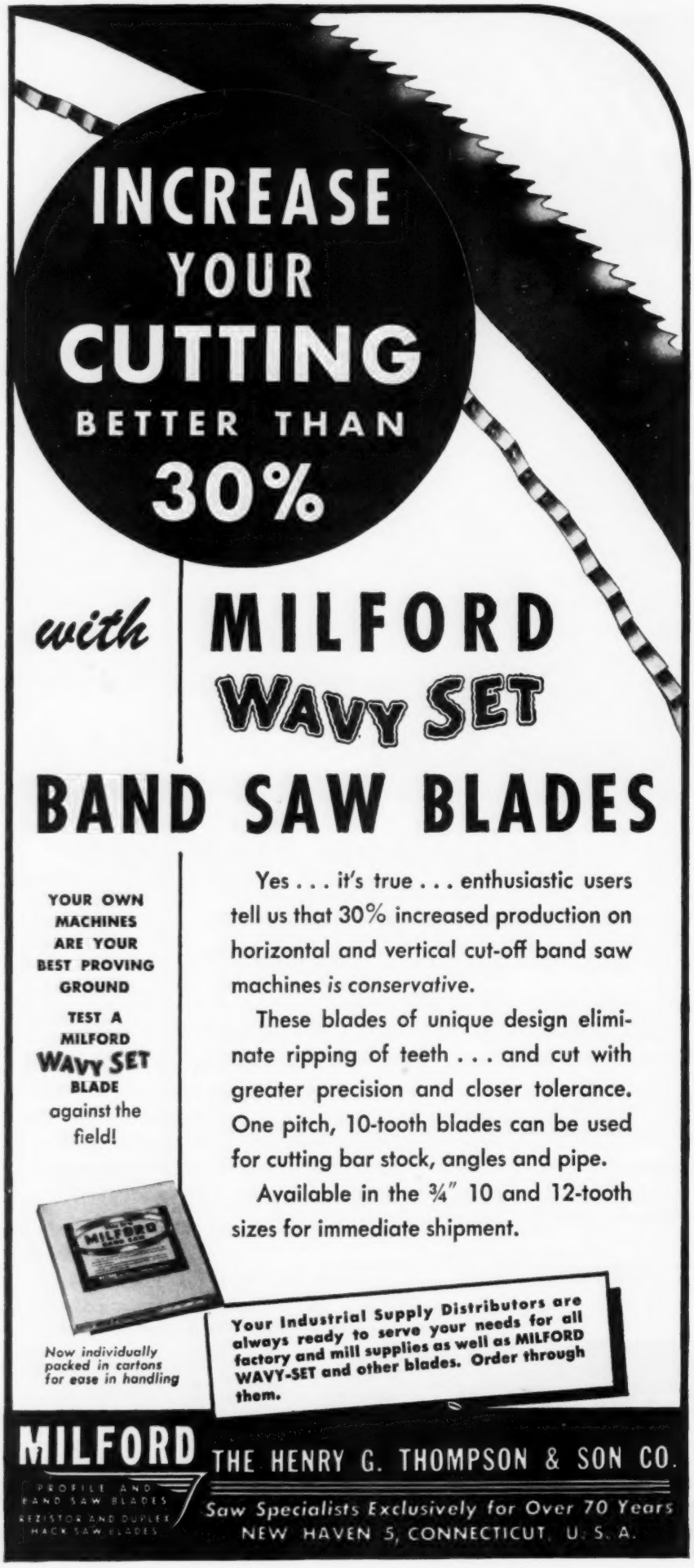
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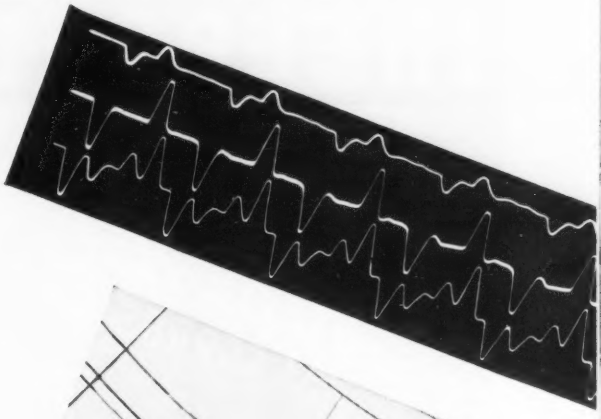
mation given by Gibson before the surface chemistry symposium, experience has established phosphate coating of metal as a widely used method of reducing wear on bearing surfaces. One treatment, known commercially as Parco Lubrizing, consists of immersion of the properly cleaned iron and steel parts in a hot phosphating solution for 10 to 15 minutes, which results in conversion of the bearing surface to a nonmetallic, oil-absorptive coating consisting chiefly of iron and manganese phosphates. Uniformity and penetration of the bearing surface by the phosphate coating and its affinity for oil is believed to be its chief property in reducing wear. Phosphate coating permits rapid break-in of new parts by preventing metal-to-metal contact and maintaining adequate oil on such surfaces at this critical time. The accompanying illustration shows the change in a finished steel surface as a result of phosphate coating to retard wear, and the cavities in the metal remaining after removal of the phosphate coating. Porous surface under the coating resulting from the surface chemical reaction provides an escape for wear particles and furnishes minute oil reservoirs when all traces of the coating have disappeared.

Phosphate coating and lubrication of steel prior to drawing reduces friction, permits faster drawing operations, reduces power consumption, and increases tool and die life. Decrease in friction resulting from the use of phosphate coated steel in drawing seamless tubing is so pronounced that it is reported that greater reduction of tube size per pass is possible; sometimes the increase in reduction is reported to be as much as one-third. Type and degree of draw determines the amount of phosphate coating required to facilitate drawing.

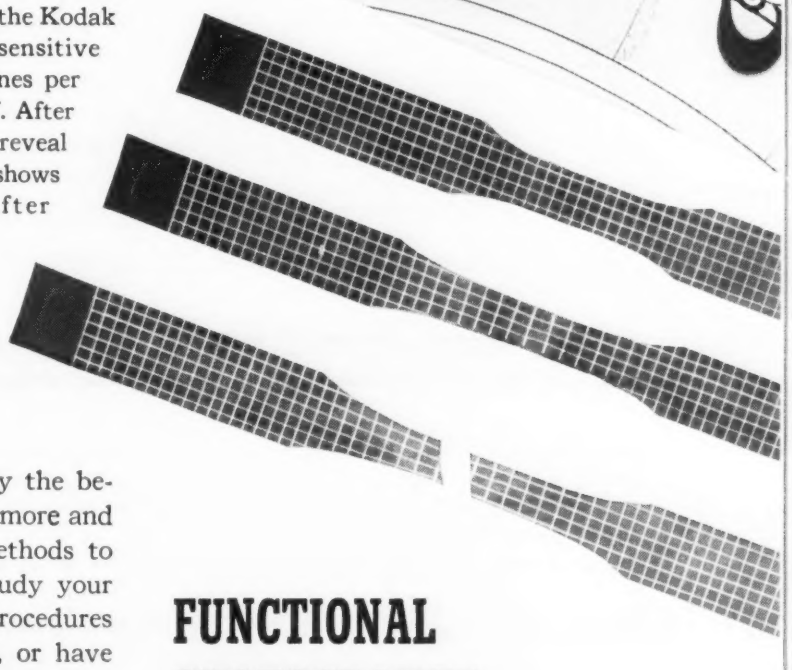
Powder Metallurgy—In discussing the relation of surface chemistry to powder metallurgical operations, Charles J. Hardy, powder metallurgist, Charles Hardy Inc., New York, brought out the fact that since powders are most frequently utilized by pressing them into usable shapes, the effect of surface conditions on the pressing operation is most important. According to Hardy, there are three basic theories put forward to explain the bonding of metal powders under pressure. First of these suggests that the irregular shape of the particles permits them to be mechanically intermeshed or interlocked under pressure. Although this theory has been generally discredited in past

3 ways photography shows the behavior of materials under stress



1. Photographic trace recording to study the behavior of materials under dynamic stress conditions . . . Using bonded wire strain gages coupled to oscillographs, this technic makes it possible to record and measure changes in stress during rapidly applied loadings. This trace recording shows strains at three points along a shouldered bar under longitudinal impact.

2. Photoelastic stress analysis to study the behavior of materials under static or dynamic stress conditions . . . Using polarized light sent through plastic models of the part under test, this technic enables the design engineer to evaluate stress concentration factors and obtain a precise knowledge of actual peak stresses prevailing. This photoelastic stress pattern shows regions of high stress in meshing gears.



3. Photo-grids to study the behavior of materials under tensile stress conditions . . . Using the Kodak Transfax Process, involving a Kodak light-sensitive material, as many as 200 accurately spaced lines per inch may be photoprinted on the material itself. After deformation, measurement of these lines will reveal distribution of plastic flow. This photograph shows photo-grids on a flat tensile specimen after elongation.

Use of photographic technics to help study the behavior of materials under stress is becoming more and more general. Why not look into these methods to determine whether they can be used to study your own products? You can set up these testing procedures relatively inexpensively in your own plant, or have such tests made by any of a number of organizations that specialize in this work. Kodak will be glad to supply you with further details.

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years, it must not be discarded since it no doubt presents a factor contributing to the strength of the part. This may be shown by the fact that a dendritic powder will have considerably greater pressed strength than a spherical powder of the same metal.

In the second place, it is well known that the friction of metals sliding upon one another generates very high temperatures at the interface, and it is therefore thought that under pressure the metal particles generate sufficient heat where they abrade against each other to form a very shallow weld. Lastly, the intimate contact brought about between the powders by the effect of pressure is sufficient to cause "cold welding" in the manner exhibited by "Jo-blocks."

It almost goes without saying that these three phenomena must operate together to give the pressed piece its strength. The powder metallurgist, however, is far more interested in what prevents the operation of these phenomena; that is, what factors are responsible for parts with poor pressed strength. It is more or less obvious, on considering the mechanism of pressing, that surface conditions are highly important to the result. Shape of the particle with which one works can rarely be altered and hence the degree of mechanical interlocking will be a property of the powder used. However, surface conditions beyond this may have serious effects on the weldability of the particles, whether it takes place hot or cold.

Surfaces Must Be Clean — Dirty, greasy surfaces can have alarming effects. Combined or adsorbed films of oxygen or other gases can completely alter the property of the pressed part. It was also pointed out that the effect of surface conditions is not always predictable; thus, a condition which is detrimental to one powder may not affect another at all. For example, an oxide film on nickel or chromium will lower the green strength often below the point of usability, while the ever-present oxide film on aluminum does not prevent the green compact from having truly extraordinary strength.

A thin film of oil on stainless steel powder so completely destroys the bonding action, that, after subjection to pressure at 50 tons per square inch, the powder still pours freely from the die. Same film applied to brass powder appears to have no effect whatsoever on strength of the pressed piece.

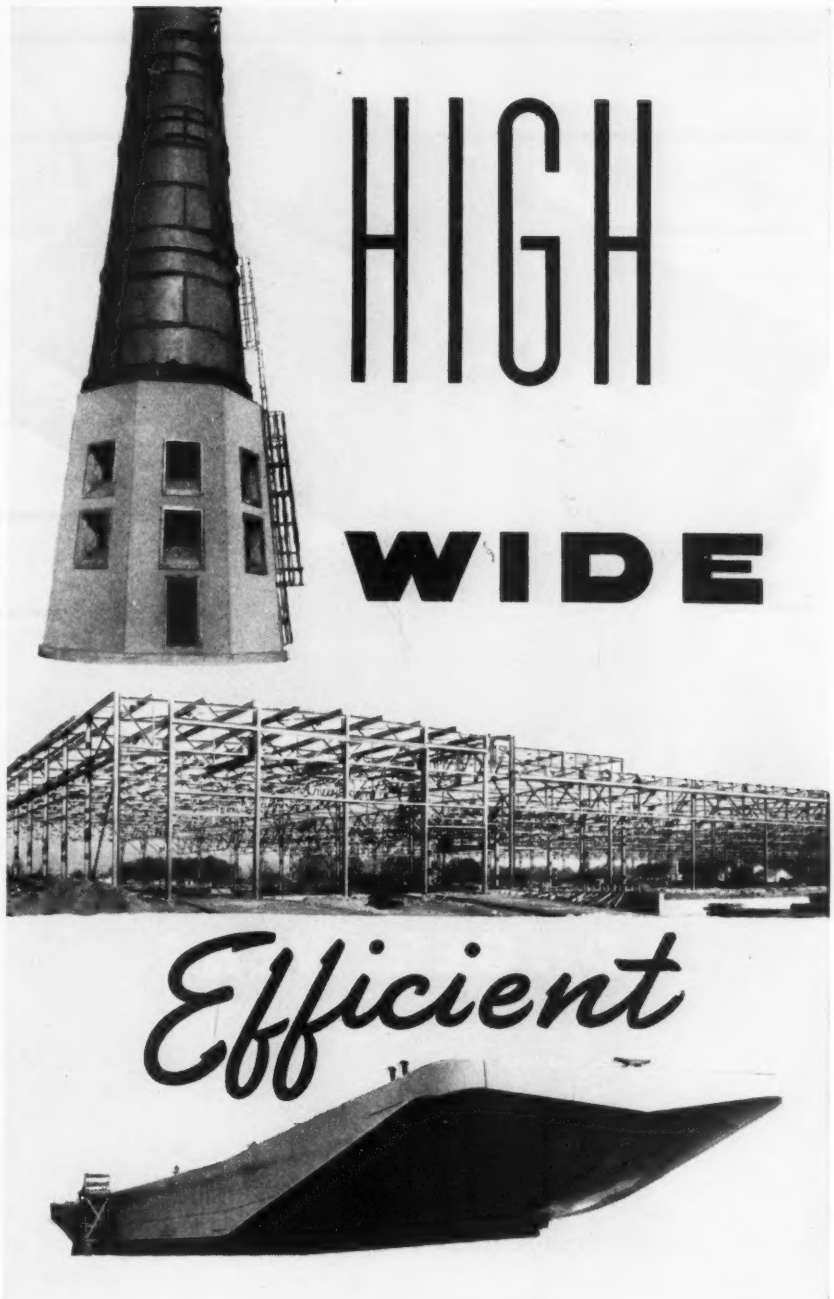
Aside from the surface condition of the powder itself, a new variable is often added in the form of a lubri-

cant. Most commonly, a metallic soap such as zinc stearate or stearic acid is blended with the powder before pressing to assist in ejecting the pressed piece from the die. By facilitating motion of the powder particles during compression, this lubricant, in some cases causes a greater pressed strength. In other cases, by forming a layer between the particles, it may act to destroy the bonds. Choice of lubricant must be made specifically for each powder since the results, although related to surface properties, are not predictable.

Sintering Conditions — When the pressed part is sintered or heat treated, the bonds which are formed during pressing are consolidated by the diffusion of each particle into the adjacent particles. This diffusion is sometimes accompanied by a wetting-type phenomenon in which the area of contact between particles is considerably increased. The conditions of sintering, that is, elevated temperature, presence of an atmosphere, and presence of volatilizing lubricants and their decomposition products, are such as to give surface reactions ample opportunity. Inherent porosity of the pressed parts, which is present even in the densest of compacts, permits the atmosphere to permeate the entire compact, and allows metal-gas reactions and vapor pressure phenomena to occur throughout the cross section.

Results obtainable with brass powder was pointed out by Hardy as an illustration of the case in question. A prealloyed powder, that is, one whose each individual grain is a true alloy brass, loses zinc at an unfortunate rate under certain conditions of sintering. This loss is largely concentrated at the exterior surface of the part, but is by no means limited to it, and the improper choice of a volatile lubricant can accelerate the loss. A lubricant which is not completely volatilized and carried off by the time the zinc vapor pressure becomes appreciable, will apparently entrain that vapor and assist in its exclusion, resulting in a higher zinc loss than if another, lower boiling lubricant is used. Atmosphere in which the brass is sintered also plays a great part in determining zinc loss.

Tests using dissociated ammonia, and varying the ratio of nitrogen to hydrogen were conducted in the Hardy laboratories, and yielded the result that zinc loss is directly proportional to the quantity of hydrogen present. Although pure nitrogen does not prevent zinc losses, it reduces them to a substantial extent. An explanation was offered by Hardy



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on the basis that the smaller hydrogen molecule penetrates the compact more readily, and hence purges it of zinc vapor more effectively than nitrogen. Density difference between hydrogen and nitrogen may also be operative. The industry's answer, so far, has been to sinter the parts in enclosed boats for as short a time as possible, but where ultimate physical properties are required, a longer sinter must be used, and the zinc loss accepted.

Organosols and Plastisols for Metal Coatings — In discussing recent developments in organic surface coatings using vinyl resins, C. W. Patton, Bakelite Corp., New York, brought out the fact that the dispersion type vinyl resins, which are the backbone of the organosol and plastisol type coatings, were first used in large quantities in this country in marine electrical cable filling compounds about five years ago. The particular resin involved was of the vinyl chloride-acetate type. Dispersions of the vinyl resins are now available in nonsolvents, which can be applied to metal surfaces at relatively high solid content, and the aggregation of small particles left, as the liquid phase dries, can be flash baked to cause fusion to a smooth film. This principle is finding further adaptation to the application of the still less soluble vinyl resins to metal products.

Another development brought out by Patton involved the coating of small diameter electrical wires with dispersion resin compounds. Coating can be done either by the conventional enameling tower technique, or by modified extrusion technique. In the latter, relatively low viscosity of the compound simplifies the problem of centering small diameter wire and obtaining a uniform, relatively thin coating on its exterior. Such coated wire is finding application in railway signal lines and electrically heated blankets for home use. Low viscosity of the material also makes it easier to encase delicate wires, connectors, inserts, etc., without having them damaged or displaced by high molding pressures.

Use of the dispersion type vinyl resin compounds for electroplating work is increasing. Through the use of these compounds, it is possible to apply extremely heavy coatings in the neighborhood of 0.040 to 0.050-inch, which are chemically resistant and also remarkably resistant to mechanical damage. This development, according to Patton, has involved very careful selection of ingredients so as to obtain a high degree of chemical resistance and also to insure that there will be no contamination of the

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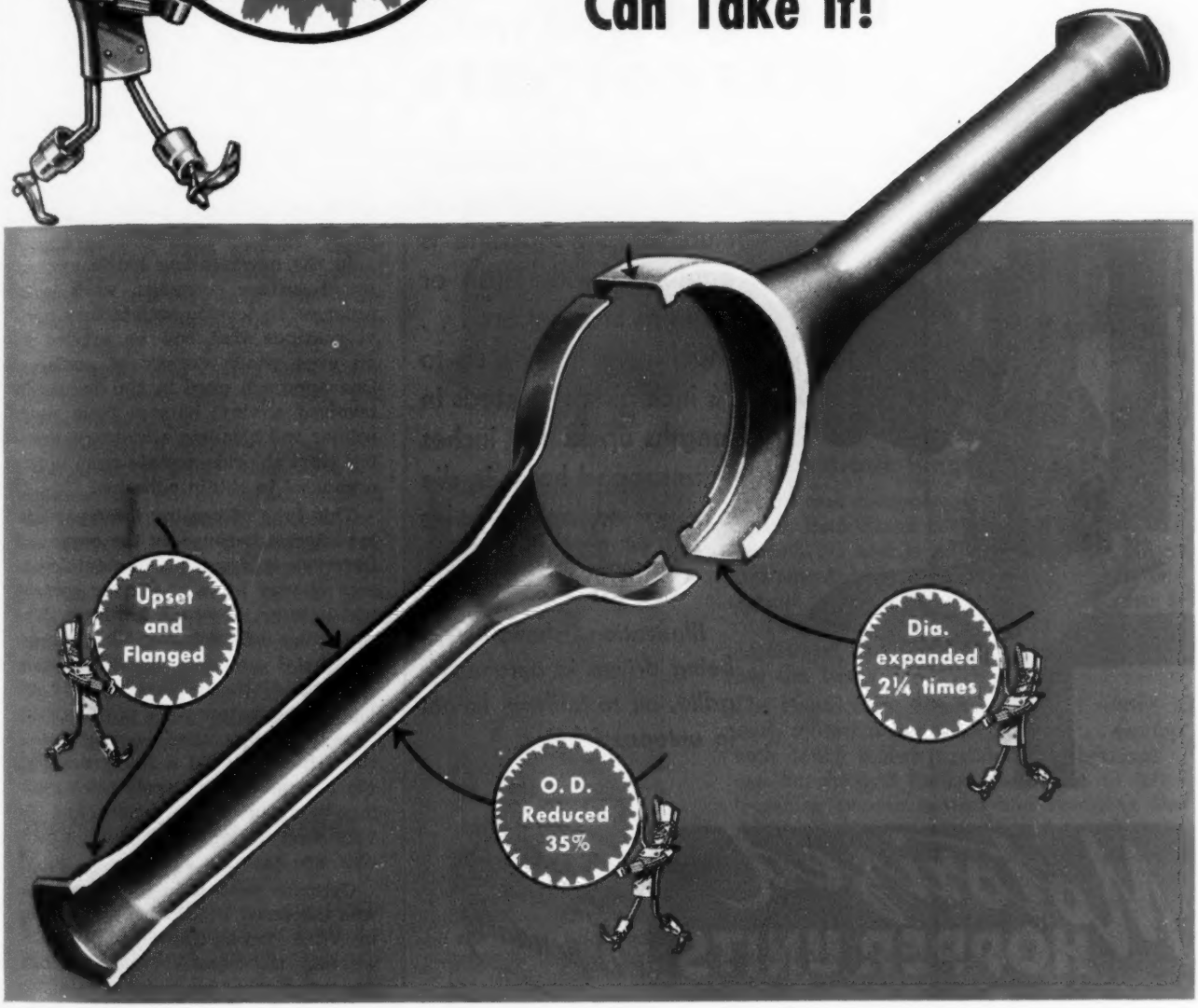

Each half of the rear axle housing above is made from a single 4½" O.D. "Standard" electric weld tube reduced approximately 35% in diameter—hot upset and flanged at one end with an increase in wall thickness of about 50%. The opposite end is then fabricated to a half-circle channeled "banjo" section with a diameter 2¼ times the original tube diameter. For a tube that is to receive the most difficult fabrication—

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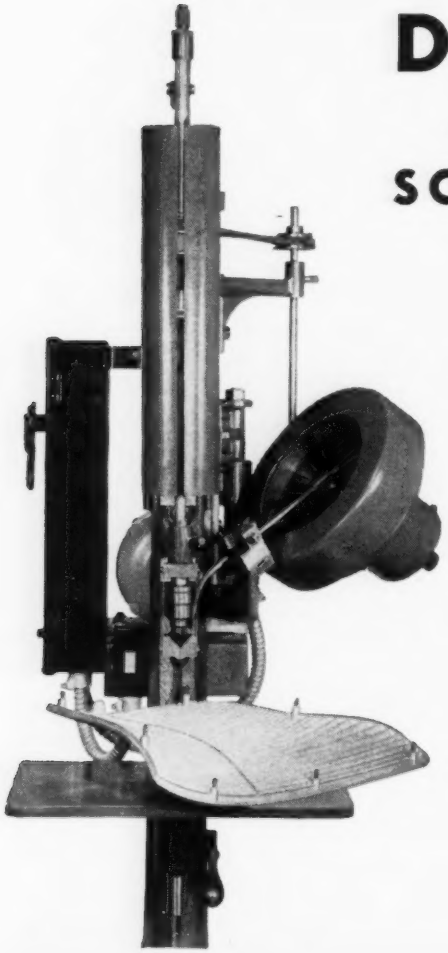

Hopper-feeding eliminates the handling of studs . . . . Machine is equipped with Titan or Modern stud-setters . . . Machine will drive up to ¼ inch diameter studs in lengths up to 1¼ inches in untapped holes in die castings or tapped holes in steel.

Illustration shows studs being driven in automobile grille, all to uniform height in untapped holes.

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plating baths. In addition, special primers have been developed to produce a firm bond of the heavy coat to the metal so that in the case of plating racks, where metal must be exposed, there will be no spread of corrosion and loss of plating efficiency on the exposed edges between the coating and the metal. Where size of the work permits, it was pointed out that it is possible to apply similar heavy coatings to plating tanks and other plating equipment.

Electrodeposition of Dispersions — Recent work indicates possibility of electrodeposition of dispersions. In one series of experiments cited where panels were dipped in an organosol, a coating of 1-1/2-mils was obtained on a plain panel. When the panel was a cathode, no coating was picked up, and when the panel was connected so as to be the anode, a coating of 6-8 mils was deposited.

In the never-ending battle against metal surface corrosion, work is in progress to develop satisfactory metal coatings that can be applied to an even wider variety of surfaces. One approach cited in the discussion involved a vinyl butyral resin wash primer and blending a hydroxyl-bearing vinyl chloride-acetate resin in the organosol to obtain adhesion.

This type of coating is of particular interest because by the organosol technique it is possible to obtain coatings of very little plasticizer content which have increased hardness. The economics of such surface coatings for metal products are interesting because (1) the vinyl resins now enjoy a much better price position relative to many other coating materials than they did a few years ago, (2) it is possible to apply thick coatings in one or two operations, and (3) very fast drying and baking schedules are possible.

Cathodic protection by magnesium was discussed before the symposium by W. S. Loose, Dow Chemical Co., wherein the results from a fundamental study of magnesium as a battery anode were presented. Some recent deveolpments and trends in industrial catalysts were discussed by James H. Boyd.

—o—

Advance Gear & Machine Corp., Los Angeles, has put into operation a Gleason spiral bevel grinder on which the company is now producing spiral, hypoid and zerol gears in maximum pitch diameters of 18 inches 10 to 1 ratio, 16 inches 2 to 1 ratio, and 12-3/4 inches 1 to 1 ratio. The grinder is believed to be the only one of its kind in use on the West Coast.

Carbide Die Construction

(*Concluded from Page* 115)

However, if a radius with a close tolerance is desired, the radii dresser should be reset several times during the operation. In surface grinding carbide with a diamond wheel, a very common practice is to use approximately 0.0002-inch depth of cut, and approximately 0.0005-inch cross feed. About 0.001 to 0.002-inch stock should be left on the piece for lapping.

Lapping—It is an established fact that carbide dies work best, and give the longest life, when lapped and polished to a high finish. This is an easy task when proper methods and materials are applied. When polishing a round draw ring, such as previously discussed, best results should be attained at a speed of 1400 to 1600 surface feet per minute. A brass pin, mounted in a hand grinder, coated with diamond powder and suspended in olive oil, will very easily remove the grinding or boring marks. A wooden lap, mounted on a pin, held in a hand grinder and coated with No. 5 diamond powder and olive oil, will produce a satin finish.

This should be followed by an operation in which a felt polishing wheel replaces the wooden wheel used in the previous operation. Medical cotton, wrapped around a piece of wood, will produce the same results. In lapping small holes, cotton, twisted on a small wooden pin, is usually the answer. A very small amount of No. 5 diamond paste is used in this operation. If an extremely high polish is desired, the same procedure should be repeated, using No. 6 diamond paste.

Special Machine Finishes Parts in Clusters

Finishing and handling are facilitated by a new machine built by Cross Co., Detroit, which processes cluster of four parts cast in a single piece. According to the company, a total of 150 sets or 600 individual valve rocker shaft brackets are drilled and reamed hourly, by a single operator. Ten holes are drilled and reamed in each casting.

Machine consists of a seven-station, power operated index table. Loading and unloading operations are performed at an independent station while the machine is cutting two clusters of four parts each in every one of six working stations. With feed hydraulically controlled, 12 sets of 48 parts are being machined at one time progressively. Maintenance costs are kept at a minimum.

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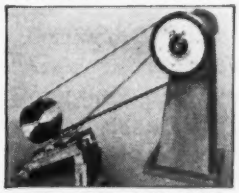

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Logan Conveyors

LOGAN CO., INC., 535 CABEL ST., LOUISVILLE 6, KY.

Forging Practice

(*Continued from Page* 127)

Saddle—Cross bar on which a pierced disk is placed, with the bar through the hole in the disk, for hammer rolling to make a weldless rolled forged ring.

Saddling—Operation of rolling a pierced disk over a mandrel and forging it to produce a weldless rolled forged ring.

Sandblast—Cleaning forgings to free them of scale by propelling sand at high velocity through air pressure, on the surface of the forging.

Shotblast — Cleaning forgings to free them of scale by propelling fine steel shot at high velocity through centrifugal force, on the surface of the forging.

Scale—Iron oxide film formed on hot metal by chemical action of the surface metal with the oxygen of the air. Practically, scale is a form of speeded-up rusting.

Scale Pit—A shallow surface depression on a forging caused by scale in the dies during the forging operation.

Seam—A longitudinal surface defect on the surface of forging stock which shows up on the forging as a long thin crack by the forging action.

Shank—Portion of a die or tool by which it is fastened and held in position in the forging unit or press.

Shoe—Holder required as a support for the stationary portion of the trimming or forming dies.

Shrinkage—Amount of contraction of a forging from the actual size at the end of the forging operation to the actual size of the forging at normal room temperature.

Sink—Specialized operation of machining impressions into forging dies.

Size—Operation in a power press or a coining press to obtain closer tolerances on portions of the forging, or to obtain closer alignment of different parts of the forging.

Smith Forging—Forging made by hand on an anvil or under a power hammer without dies containing an exact finishing impression of the part. Such forgings approximate each other in size and shape but do not have the commercial exactness of impression die forgings. Used where the limited quantities do not warrant the cost and work involved for impression dies, or where the size or shape of the piece is such as to require other than die forging means. Also called hand forging, or flat die forging.

Smith Hammer—A power hammer used for general forging work where

VANCORAM BRAND

Products for the Iron and Steel Industries

PRODUCT	TYPICAL COMPOSITION	APPLICATIONS
ALSIFER	Aluminum.....20% Silicon.....40% Iron.....40%	Used principally as a steel deoxidizer and for grain size control.
FERRO CHROMIUM High Carbon Grade	Chromium....66-70% Carbon.....4-6%	For wrought constructional steels and steel and iron castings.
Iron Foundry Grade	Chromium....62-66% Carbon.....4-6% Silicon.....6-9%	For alloyed cast irons. Readily soluble as a ladle addition at the lower temperatures of cast iron.
Low Carbon Grades	Chromium....67-72% Carbon...06%, .10%, .15%, .20%, .50%, 1.00% and 2.00% max.	For low carbon chromium steels, especially those with high chromium content, such as stainless and heat-resistant types.
FERRO SILICON 25-30% Grade	Silicon.....25-30%	Deoxidizer for open hearth steels; also for high silicon, corrosion-resistant iron castings.
50% Grade	Silicon.....47-52%	Used as a deoxidizer and for the addition of silicon to high silicon steels, for springs, electrical sheets, etc. Pulverized form used as ladle addition to cast irons for silicon content and graphitization control.
75% Grade	Silicon.....74-79%	For high content silicon steels, such as spring steels, sheets and forgings of high magnetic qualities for electrical apparatus.
High Silicon Grades 80-85% 85-90% 90-95%	 Silicon.....80-84.9% Silicon.....85-89.9% Silicon.....90-95%	 For high content silicon steels where small ladle additions are used for required silicon content. Also for manufacture of hydrogen by reaction with caustic soda and production of magnesium by the Pidgeon process.
FERRO TITANIUM High Carbon Grade	Titanium.....15-18% Carbon.....6-8%	Final ladle addition to control "rimming" action and to clean effervescing steel. Final deoxidizer and scavenger for steel castings and fully killed ingot steels.
Medium Carbon Grade	Titanium.....17-21% Carbon.....3-4.50%	Often preferred to the High Carbon Grade as a final ladle addition to very low carbon rimming, or effervescing steels.
Low Carbon Grades 20-25% Ti Grade	Titanium.....20-25% Carbon...max. 0.10% Silicon.....max. 4% Aluminum max. 3.50%	Carbide stabilizer in high chromium corrosion-resistant steels of extremely low aluminum content. Deoxidizer for some casting and forging steels.
40% Ti Grade	Titanium.....38-43% Carbon...max. 0.10% Silicon.....max. 4% Aluminum...max. 8%	Carbide stabilizer in high chromium corrosion-resistant steels, where smaller ladle additions are desired and extremely low aluminum content is not essential.
VANADIUM METAL 90% Grade	Vanadium....91.15% Aluminum.....2.25% Silicon.....0.50% Carbon.....0.17%	For special iron-free (nonferrous) or low iron alloys or low impurity ferrous alloys.
95% Grade	Vanadium....95.18% Aluminum.....2.00% Silicon.....0.27% Carbon.....0.40%	Principally for research on the properties of pure alloys, where very low iron content is essential.

PRODUCT	TYPICAL COMPOSITION	APPLICATIONS
FERRO VANADIUM Grade "A" (Open Hearth)	Vanadium....35-45% Silicon.....max. 12% Carbon...max. 3.50% Vanadium....50-55% Silicon...max. 7.50% Carbon...appr. 1.00%	For low percentage vanadium content of rolled, forged or cast constructional steels. Also used in vanadium cast irons.
Grade "B" (Crucible)	Vanadium....35-45% 50-55% Silicon...max. 3.50% Carbon...max. 0.50%	For tool steels and special high vanadium steels in which required limits for carbon and silicon are narrow.
Grade "C" (Primos)	Vanadium....35-45% 50-55% 60-65% 70-80% Silicon...max. 1.25% Carbon...max. 0.20%	For tool steels and special steels requiring high percentages of vanadium and exceptionally low carbon and silicon content.
VANADIUM PENTOXIDE Technical Grade Fused Form	V_2O_5.....90%	A source of vanadium basic electric furnace steels. A base for numerous chemical compounds.
Technical Grade Air Dried Form	V_2O_5.....83-85%	A base for preparation of numerous chemical compounds (catalysts, etc.).
GRAINAL ALLOYS Vanadium Grainal No. 1	Vanadium....25.00% Aluminum....10.00% Titanium.....15.00% Boron.....0.20%	Practical and economical intensifiers for controlling and increasing the capacity of steels to harden, and for improving other important engineering and physical properties.
Vanadium Grainal No. 6	Vanadium....13.00% Aluminum....12.00% Titanium.....20.00% Boron.....0.20%	See above.
Grainal No. 79	Aluminum....13.00% Titanium.....20.00% Zirconium.....4.00% Manganese....8.00% Boron.....0.50% Silicon.....5.00%	See above.
GRAPHIDOX No. 4	Silicon.....48-52% Titanium.....9-11% Calcium.....5-7%	For graphitization of iron; ladle treatment insures normal graphite, free from dendritic structure; reduces chill; efficient inoculant in production of high strength irons.
V-FOUNDRY ALLOYS V-5 Grade	Chromium....38-42% Silicon.....17-19% Manganese....8-11%	Used in cast irons as a ladle addition. Reduces chill, promotes uniformity of structure, increases strength and hardness.
V-7 Grade	Chromium....28-32% Silicon.....15-21% Manganese...14-16%	See above.
BRIQUETTES Ferro Chromium	Hexagonal. Weigh approx. 3¾ lb. and contain 2 lb. of chromium.	A practical and convenient form for adding ferro-alloys to the cupola.
Ferro Silicon	Two sizes, both cylindrical, one containing 1 lb. of silicon; the other, 2 lb. of silicon.	See above.
MISCELLANEOUS	Special ferro-alloys, metals, chemicals and carbides.	To meet individual requirements.

VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. · DETROIT · CHICAGO · CLEVELAND · PITTSBURGH

Let READY-POWER Solve Your Trucking Problems

Ready-Power-Equipped Baker Fork Trucks Loading Semi-Trailers

Heavy loads and long hours can't stump Ready-Power gas-electric Power Units. They are designed to "take it" and built to last. They're better than good enough to handle the toughest jobs hour after hour, day after day with constant power generated right on the truck. Specify Ready-Power for your next electric truck or write for information about converting present equipment.

Visit the Ready-Power Display at Booth 435, 3rd National Materials Handling Exposition, January 10 to 14, Convention Hall, Philadelphia, Pa.

Ready-Power-Equipped Lewis-Shepard Fork Truck

THE READY-POWER CO.

3824 Grand River Ave., Detroit 8, Michigan

impression die exactness is not required.

Soaking Heat—Holding the forging stock at a desired temperature sufficiently long to permit complete penetration of the heat throughout the forging stock.

Soft Steel—Also Mild Steel. An obsolete term used to designate low carbon steel.

Sow Block—A block of heat treated steel placed between the anvil of the hammer and the forging die to prevent undue wear to the anvil. Also called anvil cap.

Spall—Cracking off or flaking off of small particles of metal, usually in thin layers, from the surface of dies or forgings.

Sprue—Portion of the die which is removed by machining to permit a connection between the die impression and the forging bar, or between multiple impressions.

Stock — Length of bar or billet which has been cut from the full bar or billet to be used to forge into one or several forgings.

Straighten—Reducing misalignment between the various parts of a forging.

Structure—Size and arrangement of metal grains in a metal composition.

Sub-Sow Block—Block used as an adapter to permit the use of forging dies in forging equipment without replaning the shanks on the dies. The sub-sow block is often used for dies that do not have sufficient height to permit further planing on the die shanks.

Swage—Operation of reducing or changing the cross-section area of diameters by revolving the stock under fast impact blows.

Temper—Reheating steel, after the quench hardening operation, to some temperature below the critical range of the steel, to produce desired physical properties. Sometimes designated by the obsolete term of "draw".

Template—A gage or pattern made from sheet steel and used to check dimensions on forgings, or to check sections of the die impressions.

Tensile Properties—Physical property data obtained from pulling a tensile test specimen. Data obtained is the tensile or ultimate strength, yield point, percentage of elongation, and percentage of reduction in cross-section area.

Tolerance—Permissible deviation or variation from the exact dimensions or information given on the drawing.

Tongs—A metal holder used to hold hot forging stock for the forging operation or to hold cold pieces in a press where fingers may be cut.

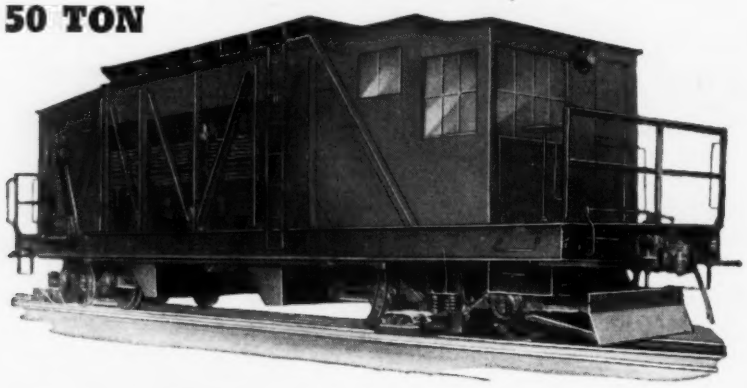
Tonghold—Small portion of metal

Ohio Rolls
SHAPING METAL FOR ALL INDUSTRY
HE-MAN STUFF
There is truth in the saying: "Don't send a boy to do a man's job." That's also good logic and sound economics in steel rolling. To do that man's-size job, to do it well, to keep at it longer without refinishing, is routine with OHIO ROLLS.
Select from any of these eleven types of Ohio Steel and Iron Rolls: Carbon Steel Rolls, Ohioloy Rolls, Ohioloy "K" Rolls, HOLL-O-CAST Rolls, Chilled Iron Rolls, Alloy Chilled Iron Rolls, Denso Iron Rolls, Nickel Grain Rolls, Special Iron Rolls, Nicoloy Rolls, Flintuff Rolls.
THE OHIO STEEL FOUNDRY COMPANY
LIMA, OHIO — Plants at Lima and Springfield, Ohio

ATLAS

BUILDS INTRA PLANT CARS TO MEET SPECIFIC, INDIVIDUAL TRANSFER PROBLEMS

50 TON

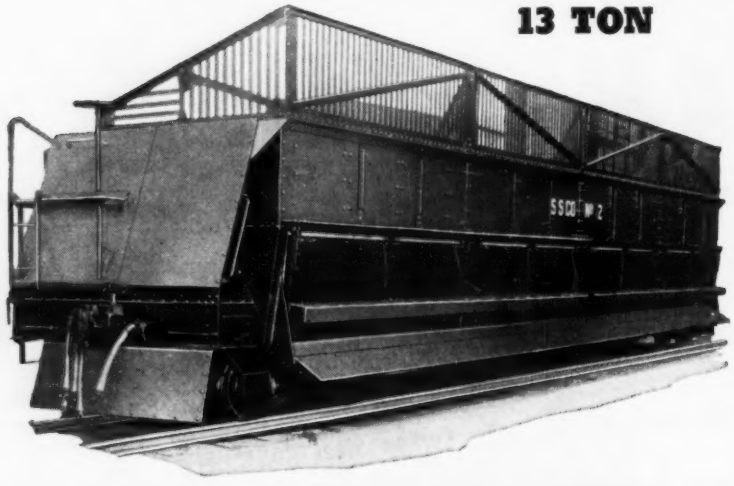


ORE TRANSFER

CENTER BOTTOM DUMP

Double-end control car with operator's cab at each end. Powered with four 75-HP motors. Car equipped with air brakes, pneumatic discharge gates and standard safety equipment and accessories.

13 TON



COKE QUENCHING CAR

Car equipped with coke racks and abrasion-resisting steel plates. Discharge gates individually operated from air cylinders. Car has air brakes and ladders, coke deflectors and standard safety equipment.

ATLAS ENGINEERING SERVICE
IS ALWAYS AT YOUR SERVICE

THE ATLAS CAR & MFG. CO.

ENGINEERS MANUFACTURERS

1140 IVANHOE RD. CLEVELAND 10, OHIO

projecting from the forging onto which tongs can be fastened to manipulate the forging.

Tool Steel—A superior grade of steel used primarily for dies and tools.

Tote Box—Metal container used to handle forgings through the various processing operations.

Trimmer — Dies used to remove flash or excess stock from the forging. The trimmer dies usually consist of the trimmer blades, which are stationary, and the trimmer punch, which is fastened to the ram of the press and pushes the forging through the trimmer blades.

Tumbling—A process for removing the scale from forgings by impact with each other, together with sawdust, jacks and abrasive material, when all are rotated in a barrel.

Type—A small, hardened block of steel shaped to a small portion of the die impression, tapped into that part of the die impression to determine the shape and dimensions accurately.

Undercut — Sections which would lock themselves into an impression and prevent removal without distortion if forged into the impression while the metal is hot.

Underfill—Also called unfilled. Portion of a forging which lacks metal to give it the true shape of the impression. Shortage of metal exists because the hot plastic metal did not completely fill the die impression.

Upend Forging—Forging in which the metal has been placed in the die so that the direction of the fiber structure is in the vertical position.

Upset—Working metal so that the cross-section area of a portion of the forging stock, or the area of all of the forging stock is increased in area.

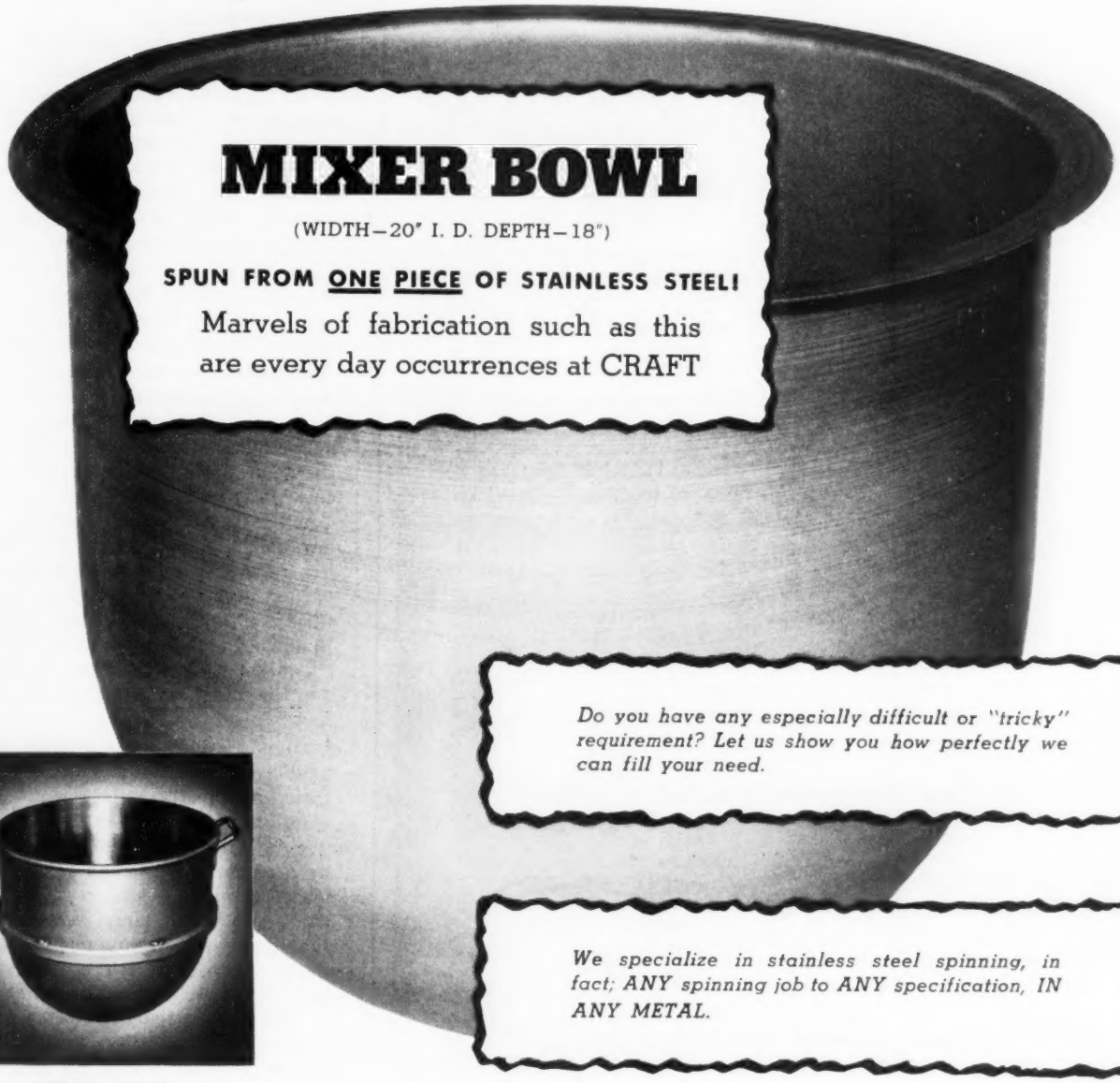
Upset Forging—Forging formed by pressure upon hot or cold metal between dies, usually operated in a horizontal plane. A forging made in the forging machine.

Weld—Uniting metal by the application of heat, or heat and pressure.

Wrought Iron—Iron made by a puddling process containing iron in fibrous form intermixed with fine slag.

Yield Point — Load at which a marked increase in the deformation of the specimen occurs without increase in load. It is usually calculated from standard tensile specimens from the load determined by the drop of the beam or by dividers in the beam type of tensile machine. It is indicated by the curve on the recording type of dial face tensile machine.

Spinning Specialists



MIXER BOWL

(WIDTH—20" I. D. DEPTH—18")

SPUN FROM ONE PIECE OF STAINLESS STEEL!

Marvels of fabrication such as this are every day occurrences at CRAFT

Do you have any especially difficult or "tricky" requirement? Let us show you how perfectly we can fill your need.

We specialize in stainless steel spinning, in fact; ANY spinning job to ANY specification, IN ANY METAL.

MIXER BOWL
COMPLETE WITH FIXTURES

Where sanitation is paramount—as in mixer bowls, steam jacket kettles and dairy equipment, no metal can compare with stainless steel, no method of fabrication can equal single piece spinning.

WRITE FOR DESCRIPTIVE CIRCULAR OF FACILITIES AND PRICES

Craft METAL SPINNING CO.
EAST DUNDEE, ILLINOIS

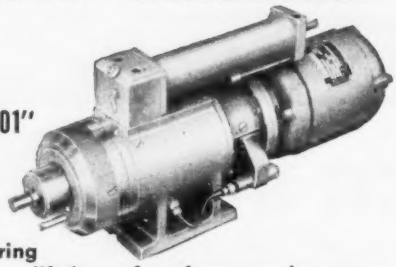
SPINNING
ANNEALING
PICKLING
POLISHING

...*"All ingenious things are simple"*

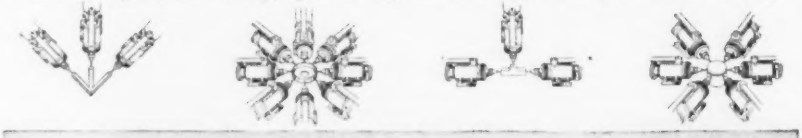
THE NEW AIR-HYDRAULIC

"CLEVELAND REPUBLIC" DRILL UNIT

1. Compact...Only 4 Moving Parts
2. Sealed Motor and Head
3. Micrometer Controlled Depth to .001"
4. Holds Spindle Runout to .0005"
5. Built-in Automatic Cycling Switch



The ingenious simplicity of engineering design in the CRT Power Unit brings a lifetime of performance in many production operations. Use its' controlled power for drilling, riveting, chamfering, spin-riveting, spot facing, slot milling, sawing and end milling.



HC250 COMPLETE, READY TO OPERATE

THE VERSATILE NEW

HC 250

DRILLING CENTERING BAR CHAMFERING

Will handle stock size to maximum of 36" long and 3" diameter. Many production operations, such as cross drilling can be added by simple attachment of extra CRT units.

THE EQUIPMENT OF THE CRT HC-250 INCLUDES: COOLANT TANK AND PUMP NON-SPLASH HOZE NOZZLES • 2-AIR ACTUATED VISE JAWS • PRESSURE REGULATORS SOLENOID OPERATED AIR VALVE • AIR LINE FILTERS • CONVENIENT CHIP REMOVAL

THE NEW "CLEVELAND REPUBLIC" VC250

A standard automatic vertical chamfering, counter boring and drilling machine in the same series as the HC250.

DON'T CLIP THIS AD and spoil your copy of "STEEL". Just write for further information and--DON'T FORGET...*there is no obligation* to get recommendations of our engineers on special machinery design and application. Send inquiries to Sales Office, Department S3.

CLEVELAND REPUBLIC TOOL CORPORATION

General Sales Office, Main Plant and Foundry Division

9615 MEECH AVENUE CLEVELAND 5, OHIO

Industrial Locomotives

(*Concluded from Page* 118)

to 400-tons per train. Operating principle employed in these locomotives is that of the planetary drive, using two compound planetary units which give four speeds forward and reverse instantly.

In plant operation, one of the requisites of the locomotive is sensitivity of control. To be of maximum use, locomotives must be able to inch their trains forward or backward so as to prevent accidents and to spot loads exactly where needed. Possibility of safe and clean use within wall confines is also of importance, as is availability within a moment's notice. Electric, diesel-electric, and diesel or gasoline engine-powered units all satisfy these requirements.

Carrying the raw materials used in the metals industries is the task of a group of specialized locomotives built by a number of companies in the field. Mine locomotives and larry cars fall into these classifications. Common feature of all mine units is low height. Built to operate where headroom is at a premium, the power-packed electric locomotives of GE, Goodman, Differential Steel Car Co., Findlay, O., and others present a low silhouette while providing adequately for the operator's safety and comfort.

Mine locomotives and larry cars built by Differential are distinctive in their motor-drive placement. The units are without axles, adjacent wheels on each rail being powered by a single motor so as to eliminate wheel slippage while rounding corners. With the larry cars, for use in dumping mine refuse and for stock-piling loose material, a dump-body acts to either side of the track or to the rear to make easy the placement of the load. This self-propelled car is designed with a specially constructed tailgate for bulldozing operations.

—o—

Sponsored by the American Society of Mechanical Engineers, the Heating, Piping and Air Conditioning Contractors National Association and the Manufacturers Standardization Society of the Valve and Fittings Industry is a new American standard for cast iron flanges and flanged fittings for refrigerant piping. It provides standard dimensions for flange facings and dimensions, drilling templates, center-to-face dimensions, minimum metal wall thicknesses and marking. A minimum grade of material is also specified.

Nonferrous Foundry

(*Concluded from Page* 120)

melting capacity of approximately 200,000 pounds a day. Heats are made up in units of 800 pounds and an average of 12 different alloys are poured in a day (sometimes as many as 16). The department is flexible for individual furnaces range in size from small crucible type floor furnaces which handle heats as low as 100 pounds to the big reverberatory furnace which handles heats of 20,000 pounds. There is a minimum of delay in the production of either small or large special analysis castings.

The machine shop has a total area of 36,400 square feet of floor space. Equipped with 97 of the most modern tools for machining to close tolerances, it has a production line setup for diesel engine and other precision type bearings as well as motor traction bearings of all types.

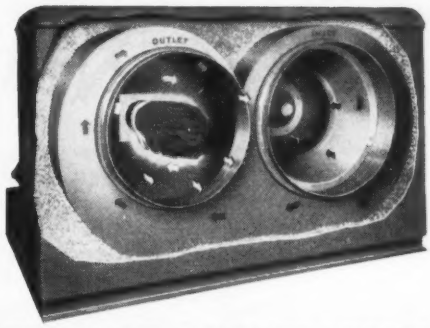
Arc Welding Electrode Specifications Completed

Completed by the Committee on Filler Metal, jointly sponsored by the American Welding Society and the American Society for Testing Materials, are four specifications for arc welding electrodes. The tentative specifications for mild steel arc welding electrodes and tentative specifications for low alloy steel arc welding electrodes represent a division of the old tentative specifications set up for iron and steel arc welding electrodes.

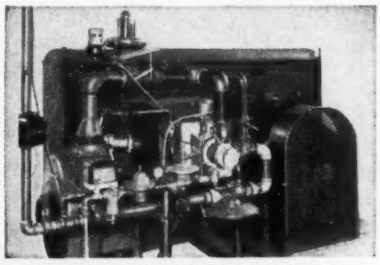
Mild steel specifications include all classifications in the E60 series generally intended for welding mild steel. Those for the low alloys include all classifications in the E70, E80, E90 and E100 classifications intended for welding low alloy steel and generally containing suitable alloying elements to match the analysis and properties of these low alloy steels. Classifications have been added in both specifications to cover the so-called "low hydrogen" electrodes.

Tentative specifications for corrosion resisting chromium and chromium-nickel steel welding electrodes has been expanded to include 40 classifications, covering over 85 per cent of the stainless electrodes now used. There are 10 series of four classifications each, including E308, E309, E310, E316, E317, E330, E347, E410, E430 and E502. Tentative specifications for copper and copper alloy metal arc welding electrodes include classifications for copper, phosphor-bronze, copper-nickel, copper silicon and aluminum-bronze materials.

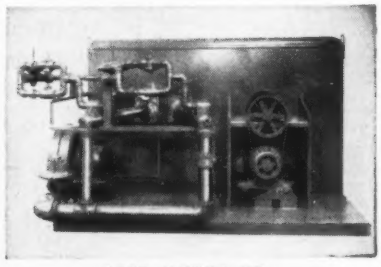
THE *Scroll-Aire* OVEN HEATER FOR PAINT DRYING, PROCESSING and CORE OVENS



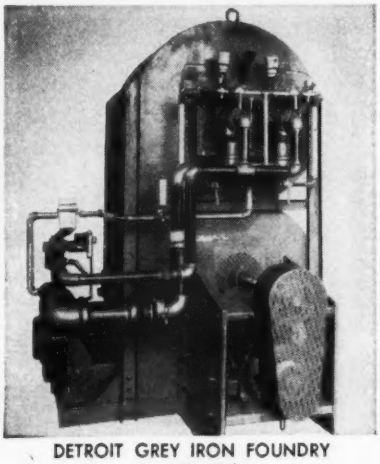
PROVEN TESTED ON A VARIETY OF APPLICATIONS LIKE THESE . . .



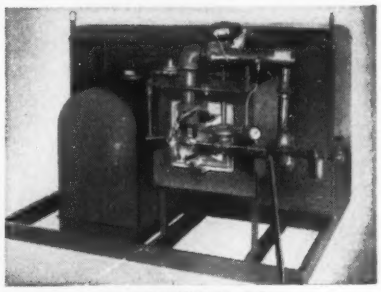
WESTINGHOUSE ELECTRIC MFG. CO.
Burns Gas and Oil



FORD MOTOR CO.
Burns Two Types of Gas



DETROIT GREY IRON FOUNDRY
Burns Gas Only



THE PARSONS CO.
Burns Oil Only

These four installations show how the Scroll-Aire Oven Heater can be adapted to various types of fuel and other conditions. Note the installation at Detroit Grey Iron Foundry (for Core Ovens) was made vertically to suit cramped conditions.

For greatest fuel economy, highest combustion efficiency and maximum versatility, the Scroll-Aire is proving itself on new applications daily. Write now for catalog which gives complete details on operation.

EST. 1912

NEWCOMB-DETROIT

Engineered Systems—Standard Units

Spray Booths • Ovens • Metal Parts Washers • Fans
Dust Collectors • Heaters • Air Handling Equipment

Grand Rapids Div.—Plant	*Main Office and Plant*	*Western Sales*
GRAND RAPIDS 2, MICH.	DETROIT 11, MICH.	CHICAGO 5, ILL.

A New Year's message to our friends

As a difficult year draws to a close we take this opportunity to express appreciation to our many customers for their business and for their patient understanding.

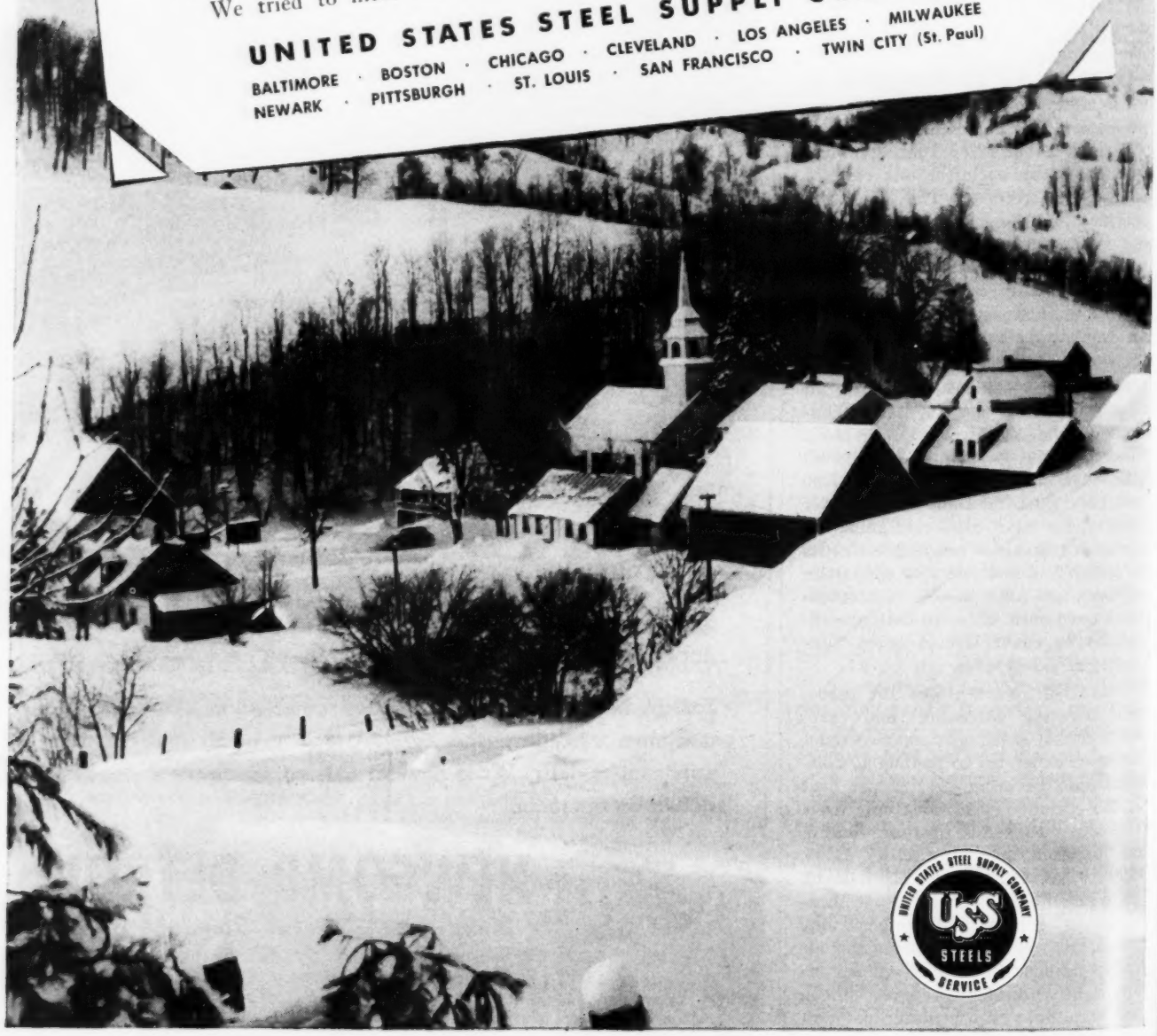
The unbelievable demand for steel created an almost insurmountable problem for the industry.

We tried to meet this situation to the best of our ability. New warehouses increased our facilities in 1948 and further improvements are planned for 1949. We are now at your service from coast to coast, determined to serve you better.

Meanwhile, let us extend our sincere best wishes for a happy holiday season and a successful New Year.

UNITED STATES STEEL SUPPLY COMPANY

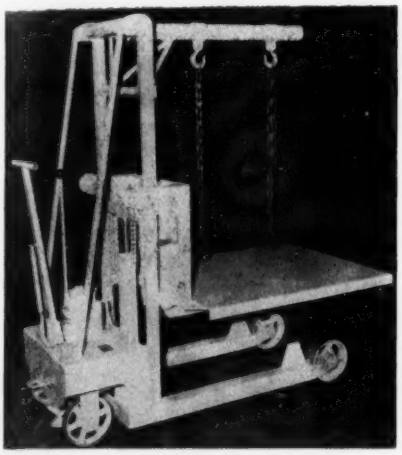
BALTIMORE · BOSTON · CHICAGO · CLEVELAND · LOS ANGELES · MILWAUKEE
NEWARK · PITTSBURGH · ST. LOUIS · SAN FRANCISCO · TWIN CITY (St. Paul)



New Products and Equipment

Die Handling Truck

Now furnished with boom and chains for die separating is the standard hydraulic high lift truck, designed by Lyon-Raymond Corp., 6444 Madison St., Greene, N. Y., to handle 3000 pound loads. The boom extends 36 inches and the hooks are fastened to sliding rings so that large or small dies can be handled on the 30 x 36



inch platform. Elevation is by a heavy duty two-speed hydraulic hand pump.

A winch with 15 feet of steel cable is provided for drawing the dies from presses to the truck platform. Stability is provided by the auto steer arrangement on the front wheels and the truck can be locked in position by a floor brake. The platform has an elevation range of from 6 to 54 inches. Welded tubular and formed steel construction provides maximum strength without unnecessary weight. Truck is also available in 1000 and 2000 pound capacities.

Check No. 1 on Reply Card for more Details

Face Milling Cutters

Two inserted blade face milling cutters which can be operated with fewer teeth on lower powered millers by pushing teeth back in the body are announced by Nelco Tool Co., Manchester, Conn. First of the tools is a fine pitch face mill for use on cast iron, brass and bronze. Interchangeable blades are available for use on any material. It features a quickly adjustable blade to which a carbide or cast alloy tip is brazed.

Second tool is a face mill designed to use a standard carbide tipped lathe tool. It can be set up as a conventional cutter or as a step cutter, making it useful for older equipment and a wider variety of work. Both are made in sizes from 6 to 14 inches in diameter.

Check No. 2 on Reply Card for more Details

Lapping Machine

Applicable to production runs or individual jobs, the Lapmaster high production lapping machine, developed by Crane Packing Co., 1800 Cuyler Ave., Chicago 13, Ill., can be operated by unskilled workmen. Work handled in one operation may be of different sizes, shapes and heights. Machine embodies a continuously agitated compound tank, an alloy iron lapping plate driven by a gear reduction

motor and combined work holders and wear rings which are held in place by adjustable bars.

Lapping cycle time is automatically controlled by a clock which stops the lapping plate and closes the compound valve. Lapping plate is continually self-conditioned, affording controlled accuracy in flat, concave and convex lapping up to 0.000016-inch. Microinch finishes of 1 to 3 rms are easily obtained. It has a 12-inch lapping plate and three wear rings, with an internal capacity of 4-1/2 inches.

Check No. 3 on Reply Card for more Details

Transmission Valve

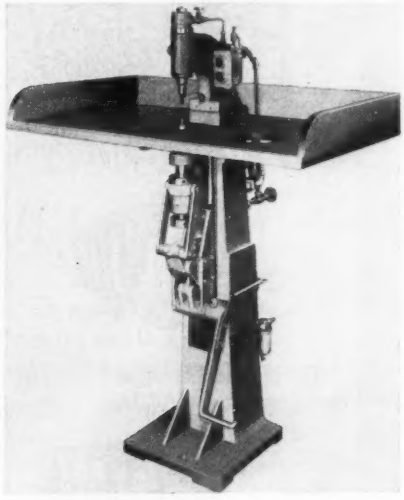
Maximum efficiency on hydraulic controls for variable speed transmissions made by Reeves Pulley Co., Columbus, Ind., is provided by a new rotary type valve. It permits entirely automatic speed regulation for synchronization of different machines and separate sections of a single machine, maintenance of control, tension and uniform peripheral winding speeds and other uniform pressure, weight, liquid level, temperature and other variable elements.

Valve is actuated with only 4 ounces pressure. Its stem is mounted on ball bearings, assuring smooth operation. Because of the rotary design, a tight fitting, cup type oil seal can be used, preventing oil leakage around the valve stem. Valve is available for replacement on transmissions now in service.

Check No. 4 on Reply Card for more Details

Pneumatic Riveter

Hill Machine Co., 1036 Mulberry St., Rockford, Ill., is producing a pneumatic riveting machine which consists of a high speed air-operated reciprocating hammer working ver-



tically toward a sturdy anvil mounted adjustably in a strong bracket. This mechanism is supported by a compact open box type of cast column with a heavy base and a stiff head casting. Hammer spindle is automatically rotated during its oscillation by a small air motor on top of the piston housing. If work requires, motor can be removed and the spindle piston locked against rotation.

Anvil is made in two ways—stationary and elevating. Both types are fully adjustable. A small 6-1/2 x 6-3/4 inch cast iron work table is generally furnished on machines having a stationary anvil. A large 24 x 40 inch table of plywood is furnished for high production work on small parts where the anvil is set into the post and operated either stationary or elevating. Hammer piston is threaded to take all standard

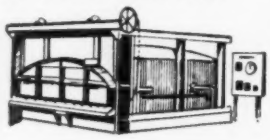
GASMACO INDUSTRIAL FURNACES

OIL or GAS FIRED for ALL TYPES of HEAT TREATING

DOUGHNUT ROTARY HEARTH FURNACES

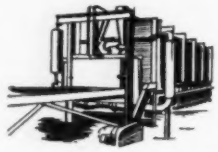
This particular furnace has baffle walls to shield controlled heating zones from high temperatures of the combustion zone, providing more accurate, uniform heating. Special insulation provides faster heating with minimum wall losses for fuel economy. Automatic charging and discharging machinery reduces labor requirements.

BOX TYPE FURNACES



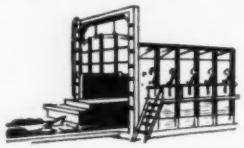
Built to specification for sintering, brazing, bright forging, annealing, hardening and draw. Designed to meet the increasing need for prepared atmospheres which will discharge material free from scale or surface decarburization. Furnished in continuous, semi-continuous or batch type for fuel fired furnaces.

RADIANT TUBE FIRED ROLLER HEARTH FURNACES



An exclusive feature of these furnaces is the Carbofrax* Tubes and Rollers which permit firing in excess of 2500° F, with fewer replacements. Complete control of the furnace atmosphere is provided. Annealing is accomplished without decarburization or scale in simple, inexpensive car, pusher, conveyor, chain or roller hearth type furnaces.

CONTROLLED ATMOSPHERE CAR TYPE FURNACES



Simply designed for long, trouble-free service and little or no maintenance. Equipped to handle material of nearly any size, shape and height. Ideally suited for heat treating, spheroidizing and annealing applications.

"CARBOFRAX" is a registered trade-mark indicating manufacture by the Carborundum Co.

All GASMACO furnaces are individually designed to fit your particular furnace requirements to assure maximum operating economy. It will pay you to investigate these furnaces for your next heat-treating job.

THE GAS MACHINERY COMPANY
16116 WATERLOO ROAD
CLEVELAND 10, OHIO

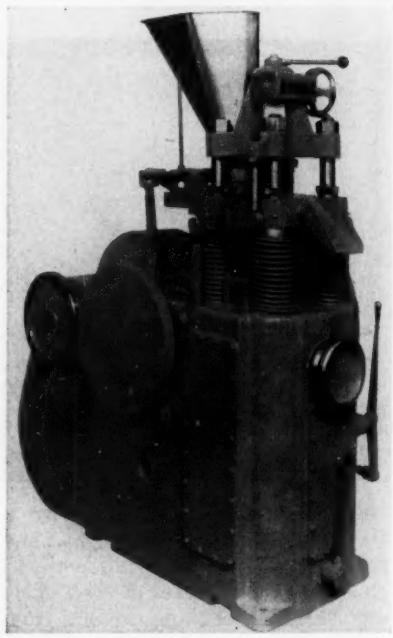
Designers · Fabricators · Erectors
Gas Plant Equipment and
Industrial Furnaces

types of peins. An automatic timer is available. Various types of controls and auxiliary equipment also are offered.

Check No. 5 on Reply Card for more Details

Dual Pressure Preformer

F. J. Stokes Machine Co., 5900 Tabor Rd., Philadelphia, Pa., is producing a model 294 dual-pressure preformer which, by means of a floating die table, applies pressure from both top and bottom at the same time. Pressure applied in this manner produces preforms of uniform density throughout, resulting in fewer rejects and lower preheating costs. Because of this design, less power is required to apply high pressures and punch and die wear is reduced.



Power application is arranged so that press cannot jam, nor can it rest on dead center. Preforms are produced up to 4 inches in diameter with a die fill of 2⅝ inches. The large die area permits making irregular and rectangular pieces up to 6 inches in length and 4 inches in width. Start-stop controls, production counters and exact pressure controls are offered as auxiliary equipment.

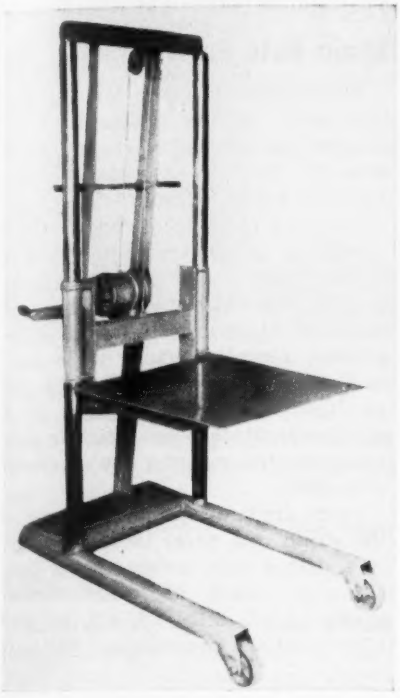
Check No. 6 on Reply Card for more Details

Portable Elevator

Type C portable elevator, made by Montgomery & Co. Inc., 53 Park Place, New York 7, N. Y., is available in various capacities for both hand and electric operation. Various sized platforms and heights also are available. Pictured is the standard type C elevator which has a capacity of 750 pounds, is 69 inches high and

requires a floor space of 25 x 39 inches. It has two stationary and two swivel 4-inch casters and a 24 x 24 inch platform. Minimum and maximum lifting heights are 6 and 53 inches.

Features of the line include: Lifetime bronze bushings, a light weight mechanical tubing frame which elimi-

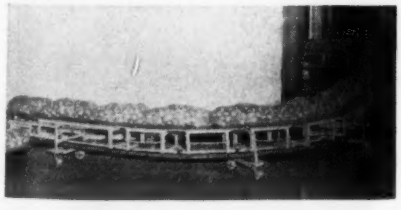


nates dead weight, a push bar for moving, an easily operated floor lock, self-locking safety type winch, a three-speed handle adjustable for light, medium and heavy loads and gears which operate in a grease bath.

Check No. 7 on Reply Card for more Details

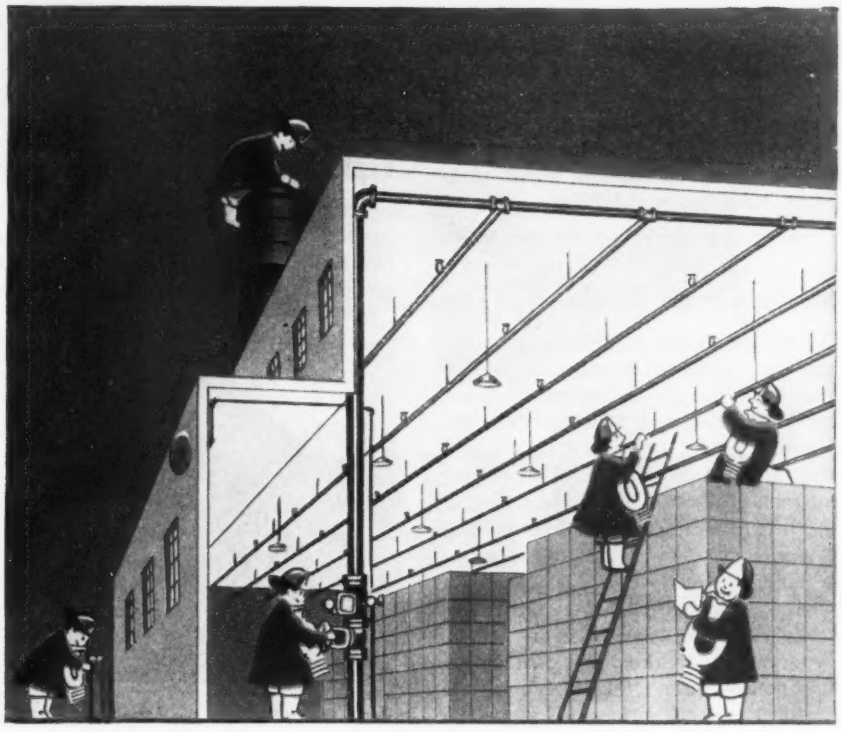
Flexible Conveyor

A four-way conveyor, manufactured by H. W. Creager Mfg. Co., Arvada, Colo., is so flexible that it will carry boxes, crates, barrels, etc., through a box car door and to the end of the car. It can be curved



into more than right angles, a 90 degree turn being made in a floor space of only 6 feet. The unit is flexible horizontally and vertically at the same time and can be formed into "S" and "L" turns.

Conveyor, operating on a continuous track principle, is available in 20 to 40 foot lengths. Motion is reversi-



Why Sprinkler Inspections Are All Important

YOU MAY HAVE the best sprinkler system available, but how sure are you of its readiness and ability to combat fire? After all, a sprinkler system, like any other mechanical device not properly maintained, may fail at its time of need. That could mean bad news to you, Mr. Property Owner. That's why you should know of the primary advantages of "Automatic" Sprinkler **Inspection Service.**

Realizing the vital importance of assured sprinkler system operation, "Automatic" Sprinkler, at the advent of its business some 55 years ago, established an **Inspection Service** Department. **Inspection Service,** which is handled only by individuals thoroughly familiar with all types of sprinkler equipments, actually augments periodic insurance bureau inspections and provides you with a double check on the general efficiency of your fire protection equipment.

Inspection Service detects minor irregularities and provides for correction before major repairs are necessary. It brings to your attention the need of extensions to your present equipment should property expansion so demand. In short, "Automatic" Sprinkler **Inspection Service** is an integral factor in every over-all fire safety program and its true value worth considerably more than is the small annual charge that is made for it.

Don't wait for fire to strike and then hope for the best. Be assured through **Inspection Service** that your fire protection will really protect, today—tomorrow—next week or whenever it is needed. "Automatic" Sprinkler Corporation of America, Youngstown 2, Ohio.

"Automatic" Sprinkler

FIRST IN FIRE PROTECTION

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ble for loading and unloading without moving the conveyor. Units roll on heavy casters. Power is furnished by a 2 horsepower electric motor. Standard, 2-foot extra sections can be added to the conveyor for any length. The continuous metal platform rides on a chain.

Check No. 8 on Reply Card for more Details

Starter-Circuit Breaker

Line of Bulletin 4130 alternating current combination magnetic starters with circuit breakers, designed by Ward Leonard Electric Co., Mt. Vernon, N. Y., fulfill N.E.C. requirements for motor branch circuit overcurrent protection, disconnect means, motor running overcurrent device and motor controller. Each unit consists of a magnetically operated contactor with thermal inverse time delay overload relays combined with a thermal type circuit breaker, the devices being housed in a NEMA type I enclosure.

Externally operated from the front, all circuit breakers have provision for locking the "off" position and are interlocked mechanically to prevent opening enclosure door when the breaker is "on." Units are offered in five standard sizes to 200 horsepower, 3-phase, 550 volts, 60 cycles maximum.

Check No. 9 on Reply Card for more Details

Explosion Proof Motor

Wagner Electric Corp., 6400 Plymouth Ave., St. Louis 14, Mo., is building totally enclosed fan-cooled motors in the 736 frame size, in ratings of 200 horsepower and with speeds of 3500, 1750, 1160 or 870 revolutions per minute, for operation on 550 volts or less. Motors of 150 horsepower with the same speed ratings are also being built, for operation on 2300 volts.

Motors are approved by Underwriters' Laboratories for Class I Group D and Class II Groups E, F and G hazardous locations. They have a cast aluminum rotor with heavy duty ball bearings, a one-piece cast iron frame and an externally mounted fan.

Check No. 10 on Reply Card for more Details

Strain Rate Pacer

Distinguishing feature of the new type strain rate pacer announced by Baldwin Locomotive Works, Philadelphia 42, Pa., for operation in conjunction with Baldwin testing machines, is a more accurate and direct indication of the rate of displacement between test specimen gage points. Transmitter unit of the pacer is mounted in the Baldwin autographic recorder where it is controlled by the extensometer on the specimen. Indicator unit is in a small separate cabinet which is connected to the recorder by an extension cable.

There are two essential elements of the strain rate pacer indicator. One is a dotted disk, rotated by a synchronous motor at predetermined speeds of 0.5, 0.75, 1.0, 1.5, 2.0 and 2.5 revolutions per minute. Other is

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HI-GRADE METALLIC

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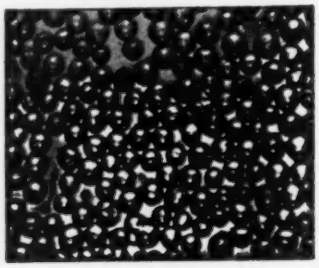
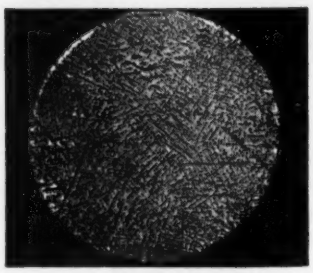
SHOT
- ROUND
- UNIFORM IN SIZE
- UNIFORM IN HARDNESS
- LACKS IRREGULAR SHAPES

GRIT
- RECTANGULAR
- SHARP
- TOUGH
- DURABLE



UNRETOUCHED PHOTO OF HI-GRADE SHOT

CLAYTON-SHERMAN ABRASIVES COMPANY
3896 LONYO ROAD
DETROIT 10, MICHIGAN
CEdar 7200



MICROSCOPIC STRUCTURE OF METAL

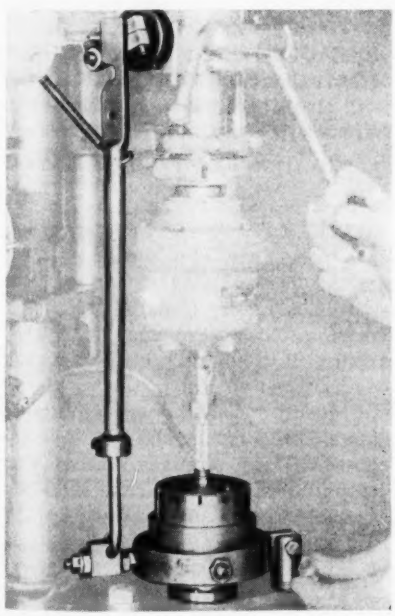
coaxial pointer which is rotated by a self-synchronous motor under control of a self-synchronous generator unit in the recorder, at a rate proportional to strain in the specimen. Straining rate in the specimen can be

set and maintained by adjusting the testing machine load. To expand the range of pacing speeds, additional synchronous motors or other speeds are available.

Check No. 11 on Reply Card for more Details

Collet Chuck

Goodwin Mfg. Co., 10 East Broadway, Cuyahoga Falls 20, O., is offering a mechanical linkage that adapts its standard quick-acting collet chuck for attachment to any standard make

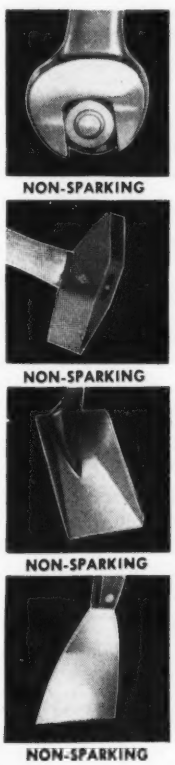


of drill press, making it possible to perform production drilling and tapping operations. Two bolts and 15 minutes time are required to attach the chuck to a drill press.

Mechanical linkage connects the drill quill to chuck collar so that the chuck is automatically closed and locked as the tool approaches the

Clean up your HAZARDS

with Ampco non-sparking safety tools



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Play safe with your profits. Don't let them go up in smoke. Ampco Safety Tools help keep your profits where they belong — in *your* pocket! That's why leading chemical plants, oil refineries, mines, etc. include the following basic safety rule: They *use Ampco Tools on any job where a spark spells disaster.*

It pays you to standardize on Ampco Tools for use around explosive fumes, liquids, gases, or dust. It's a step that promotes your safety program. It helps make your men's lives safe, protects your plant, guards your production against costly interruptions.

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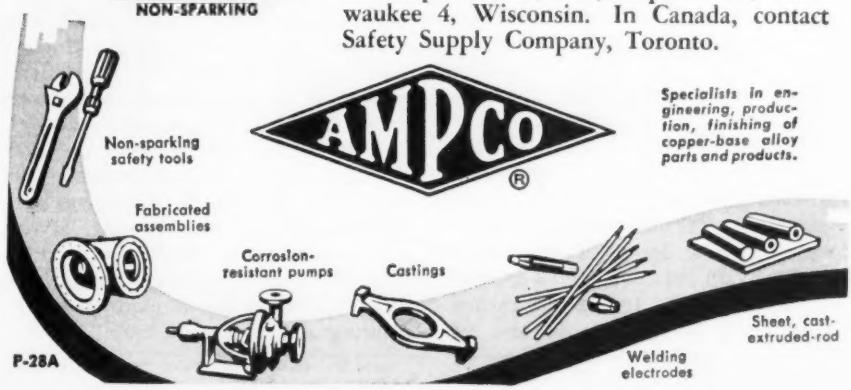
You can often earn lower insurance rates by using safety tools. In fact, *you* are the gainer from every angle, when you use Ampco Tools.

Equip your workmen with Ampco Safety Tools. Send for a complete FREE catalog — Ampco Metal, Inc., Dept. S-12, Milwaukee 4, Wisconsin. In Canada, contact Safety Supply Company, Toronto.

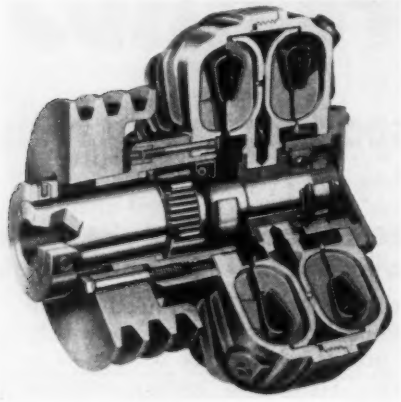


work piece. Return of drill press handle releases work piece instantly. Chuck can be fitted with a spring ejector or it can be set up to allow work piece to drop through into a parts basket. Threaded nose cap can be removed easily to facilitate collet change. It can be turned to adjust collet gripping pressure. Collets are available in 1 and 2 inch capacities.

Check No. 12 on Reply Card for more Details

Power Transmission Unit

A hydraulic conversion device for small electric motors and internal combustion engines is the Hydro-Sheave drive, a new hydraulic power transmission unit developed by Twin Disc Clutch Co., Rockford, Ill. Basis for the unit is a small Twin Disc hydraulic coupling. Designed for use with Worthington quick detachable V-belt sheaves, the unit consists of the coupling, with a sleeved shaft which slides directly over the output shaft of any small electric motor or engine.



Oil is the only medium of power transmission. A sudden shock or overload is absorbed by the fluid in the coupling and torsional vibrations are effectively dampened out. Application may be on cranes, conveyors, elevators, fans, winches, machine tools, and various other equipment. Models are designated according to size of hydraulic coupling used. Five sizes are available.

Check No. 13 on Reply Card for more Details

Instrument Cubicles

Designed to contain any and all types of control, recording and indicating instruments, a standard line of cubicles, built by K & H Industrial Products Inc., are fabricated of 10-gage steel. They are equipped with hinged access doors in the rear. Widths of 18, 24, 30 and 36 inches, depths of 12, 15, 18 and 21 inches and heights of 72, 78, 84 and 96 inches are available. Units can be furnished in any specified combination of these dimensions.

Two different types are available. Type No. 1 is the individual cubicle, any number of which can be bolted together to provide a wide variety of combinations. Type No. 2 consists of a specified number of cubicles which are welded together as a complete unit, but with a divided front simulating individual sections. Either type can be fabricated with vapor-sealed doors and gas-tight seams for use under hazardous conditions. Hand-rubbed and buffed, satin and flat finishes are offered in any color or combination.

Check No. 14 on Reply Card for more Details

• • •

SOOT REMOVER: Nalco SR-150, a new chemical soot remover, removes soot by lowering its ignition temperature to 775° F, where normal furnace temperatures will burn it off. The material, developed by National Aluminate Corp., Chicago 38, Ill., is made in powder form which vaporizes completely on contact with fire bed. These vapors penetrate the soot and bring about ignition.

Check No. 15 on Reply Card for more Details

STEEL SHELVING: Tri-State Metal Products Inc., Pittsburgh 30, Pa., offers steel shelving which can be assembled to form a wide variety of units. All shelves are of 18 gage prime steel, backs and side are 22 gage prime steel and posts are 13 gage prime steel.

Check No. 16 on Reply Card for more Details

TAKE-UPS: Two new take-ups are offered by Dodge Mfg. Corp., Mishawaka, Ind. Type E was designed to meet demand for a roller bearing take-up available from stock. Positive adjustment of the take-up is made by turning screw heads at either end. Type H is designed for general conveyor and elevator service. Both types are available in a wide range of sizes.

Check No. 17 on Reply Card for more Details

FASTENER: Dzus Fastener Co. Inc., Babylon, N. Y., has added a Supersonic fastener to its line. It consists of a fully enclosed spring receptacle which is engaged by a stud embodying the spiral-cam principle so that it will open or close by rotating the stud a quarter turn. Fasteners are available in all of the sizes, styles and increments of length specified in Air Force-Navy specification AN-F-8b and receptacle is made both in floating and stationary form.

Check No. 18 on Reply Card for more Details

SOLENOID VALVE: The Caltrol solenoid shut-off valve, developed by Caltron Products Co., Los Angeles, Calif., is available in aluminum, brass and stainless steel. The electrical section of the valve is completely isolated from the flow section with no possiblity of fluids contacting the coil. Valve will operate under a wide range of pressures from 0 to 600 pounds per square inch.

Check No. 19 on Reply Card for more Details

HYDROCHLORIC ACID ABSORBER: Model 6B falling-film type hydrochloric acid absorber is announced by National Carbon Co. Inc., New York, N. Y. It is a packaged unit complete with all accessories for automatic operation. Output of the unit is relatively high as it produces 2½ to 16 tons of acid per day.

Check No. 20 on Reply Card for more Details

PLUG GAGES: DuBo plug gages with hard chrome plating on the gaging surfaces are offered by Standard Gage Co. Inc., Poughkeepsie, N. Y. They are recommended for long runs and for checking the more abrasive materials such as aluminum castings.

Check No. 21 on Reply Card for more Details

TIMER: Dimco-Gray Co., Dayton 2, O., offers model 169 Gralab timer, with a minimum setting of 1 minute and a total range of 60 minutes by minutes. It has an 8-inch dial made of corrosion resistant stainless steel with black numerals and graduations. Capacity is 6 amperes at 125 volts.

Check No. 22 on Reply Card for more Details

SWIVELS: Twist and line unlaying in wire ropes are eliminated with the use of Miller anular ball bearing swivels, made by General Machine & Welding Works, Pomona, Calif. They are useful in hoisting steel sheets and beams, loading pipe, setting forms and loading various types of field equipment. Swivels are precision machined of high strength steel in sizes comparable to wire rope and are available in ten different styles.

Check No. 23 on Reply Card for more Details

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Market Summary

DEMAND— All the signs indicate the steel mills will be kept engaged at capacity right through the first half of next year meeting the heavy demands of consuming industry for all types of steel products. Despite reported appearance of soft spots in the overall economic situation, there is as yet no reflection of such in the steel market. While buyers are beginning to display a little more caution in ordering, demand continues far in excess of supply and no letup in pressure on the mills is in evidence.

QUOTAS— Mill tonnage carryovers into the first quarter of next year will be substantial. As a result some producers are blanking out January production entirely to care for the backed-up tonnage. At the same time, with uncertainty continuing as regards certified tonnage due to extension of existing voluntary allocation programs beyond the Feb. 28 expiration date of Public Law 395, most of the steelmakers are reluctant to make firm commitments on tonnage through the first quarter for the general consuming trade. Some of them are allotting tonnage on a monthly basis, and in only a few instances have allotments been set up beyond February.

ALLOCATIONS— Extension of most of the existing voluntary allocation programs for six months beyond the Feb. 28 expiration date of Public Law 395 means supplies of so-called "free" steel will be no larger over coming months than they have been in the recent past. The steel task committee now is working out schedules on the voluntary programs recently approved for extension and it would not be surprising if some of the mills were called upon to roll more certified tonnage in February than had been anticipated.

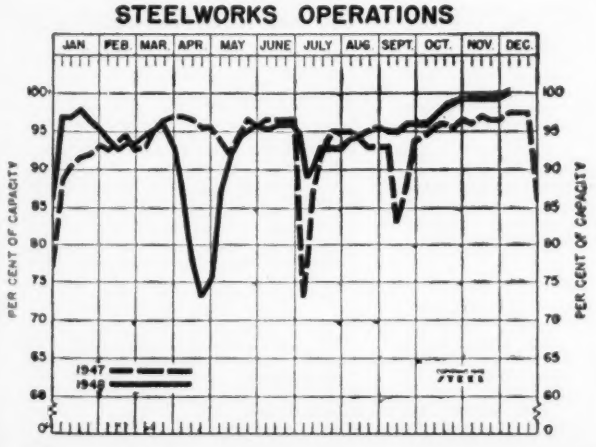
RAW MATERIALS—Steelmaking raw material supply situation continues to improve. Pig iron supply is slightly better though demand still is far in excess of sellers' ability to satisfy. However, demand from the foundry trade is somewhat less pressing with foundries reporting a noticeable easing in castings demand. Order backlogs of some foundries have shrunk to the point where they are now operating only three and four days a week. Some observers are of the opinion a buyers' market in castings now is definitely here with castings salesmen beating the bushes for business. Scrap supply also is improved with mill inventories reported the best in a long time.

CAPACITY—Steelmakers have been straining to meet the sustained heavy demand for steel products since the end of the war in the face of almost insurmountable difficulties. New production facilities have been installed and old ones modernized. As a result steel ingot production this year will total around 88,700,000 tons, a new peacetime record and only about 1 million tons less than had been produced in the record wartime year, 1944. Since 1938, steelmaking capacity has been increased 17.5 per cent, or more than 14 million tons. This has been accompanied by an increase of about 19 per cent in blast furnace capacity in the 10-year period.

PRODUCTION—Steelmaking operations increased 1 point last week to 100 per cent of ingot capacity. This lifted production to the highest level ever attained in war or peace, or to the equivalent of 1,804,300 net tons of ingots and castings. The previous all-time high of 1,791,700 tons was established during the week ended Nov. 13.

PRICES—No major price change was reported in the steel market last week. STEEL's arithmetical price composites held unchanged and compared with those for the like 1947 week as follows: Finished steel, $95.50 and $76.09; semi-finished steel, $75.75 and $57.20; steelmaking pig iron, $46.29 and $36.31; steelmaking scrap, $43.25 and $40.42.

STEELWORKS OPERATIONS



DISTRICT STEEL RATES

Percentage of Ingot Capacity engaged in Leading Districts

	Week Ended Dec. 4	Change	Same Week 1947	Same Week 1946
Pittsburgh	96	None	102.5	50
Chicago	99.5	+ 1	95	75
Eastern Pa.	97	+ 2	93.5	57
Youngstown	105	None	100	35
Wheeling	97	+ 1.5	93.5	82.5
Cleveland	102	+ 5.5	88.5	92
Buffalo	104	None	88.5	51
Birmingham	100	None	103	45
New England	90	None	85	90
Cincinnati	103	None	87	84
St. Louis	89.5	+ 5	87	72.5
Detroit	100	+ 1	92	90
Estimated national rate	100	+ 1	97.5	60.5

Based on weekly steelmaking capacity of 1,802,476 net tons for 1948; 1,749,928 tons for 1947; 1,762,381 tons for 1946.

COMPOSITE MARKET AVERAGES

Arithmetical Price Composites*

	Dec. 4	Nov. 27	Month Ago Nov. 1948	Year Ago Dec. 1947	5 Years Ago Dec. 1943
Finished Steel	$95.50	$95.50	$95.16	$76.15	$56.73
Semifinished Steel	75.75	75.75	75.75	57.20	36.00
Steelmaking Pig Iron	46.29	46.29	46.29	36.31	23.00
Steelmaking Scrap	43.25	43.25	43.25	40.13	19.17

FINISHED STEEL WEIGHTED COMPOSITE†

Nov. 1948	4.14340c
Oct. 1948	4.14340c
Sept. 1948	4.13446c
Nov. 1947	3.47537c
Nov. 1943	2.39672c

***STRAIGHT ARITHMETICAL COMPOSITES:** Computed from average industry-wide mill prices on Finished Carbon Steel (hot-rolled sheets, cold-rolled sheets, cold-rolled strip, hot-rolled bars, plates, structural shapes, basic wire, standard nails, tin plate, standard and line pipe), on Semifinished Carbon Steel (rerolling billets and slabs, sheet bars, skelp, and wire rods), on Basic Pig Iron (at eight leading producing points), and on Steelworks Scrap (No. 1 melting grade at Pittsburgh, Chicago and eastern Pennsylvania). Steel arithmetical composites, dollars per net ton; pig iron and scrap, gross ton.

†**FINISHED STEEL WEIGHTED COMPOSITE:** Computed in cents per pound, mill prices, weighted by actual monthly shipments of following products, representing about 82 per cent of steel shipments in the latest month for which statistics are available, as reported by American Iron & Steel Institute: Structural shapes; plates, standard rails; hot and cold-finished carbon bars; black butt weld pipe and tubes; black lap weld pipe and tubes; black electric weld pipe and tubes; black seamless pipe and tubes; drawn wire; nails and staples; tin and terne plate; hot-rolled sheets; cold-rolled sheets; galvanized sheets; hot-rolled strip; and cold-rolled strip. October and November, 1948, figures are preliminary.

COMPARISON OF PRICES

Representative market figures for current week; average for last month, three months and one year ago. Finished material (except tin plate) and wire rods, cents per lb; semifinished (except wire rods) and coke, dollars per net ton, others dollars per gross ton. Delivered prices represent lowest from mills.

Finished Materials

	Dec. 4 1948	Nov. 1948	Sept. 1948	Dec. 1947
Steel bars, Pittsburgh mills	3.45c	3.45c	3.45c	2.90c
Steel bars, del. Philadelphia	3.79	3.79	3.79	3.318
Steel bars, Chicago mills	3.35	3.35	3.35	2.90
Shapes, Pittsburgh mills	3.275	3.275	3.275	2.80
Shapes, Chicago mills	3.25	3.25	3.25	2.80
Shapes, del. Philadelphia	3.48	3.48	3.48	2.954
Plates, Pittsburgh mills	3.50	3.50	3.50	2.95
Plates, Chicago mills	3.40	3.40	3.40	2.95
Plates, del. Philadelphia	3.71	3.71	3.71	3.17
Sheets, hot-rolled, Pittsburgh mills	3.275	3.275	3.275	2.80
Sheets, cold-rolled, Pittsburgh	4.00	4.00	4.00	3.55
Sheets, No. 10 galv., Pittsburgh	4.40	4.40	4.40	3.90
Sheets, hot-rolled, Gary mills	3.25	3.25	3.25	2.80
Sheets, cold-rolled, Gary mills	4.00	4.00	4.00	3.55
Sheets, No. 10 galv., Gary mills	4.40	4.40	4.40	3.90
Strip, hot-rolled, Pittsburgh mills	3.275	3.275	3.275	2.80
Strip, cold-rolled, Pittsburgh mills	4.375	4.375	4.375	3.55
Bright basic, wire, Pittsburgh	4.325	4.325	4.325	3.675
Wire nails, Pittsburgh mills	5.775	5.775	5.775	4.625
Tin plate, per base box, Pitts. dist.	$6.70	$6.80	$6.80	$5.75

Semifinished

Sheet bars, mill	$67.00*	$67.00*	$67.00*	$53.57
Slabs, Chicago	52.00	52.00	52.00	40.18
Rerolling billets, Pittsburgh	59.00	59.00	59.00	40.18
Wire rod $\frac{5}{32}$ to $\frac{1}{4}$-inch, Pitts. dist.	3.775c	3.775c	3.775c	3.05c

* Nominal.

Pig Iron

	Dec. 4 1948	Nov. 1948	Sept. 1948	Dec. 1947
Bessemer, del. Pittsburgh (N.&S. sides)	$48.08	$48.08	$48.08	$37.913
Basic, Valley	46.00	46.00	43.00	36.00
Basic, eastern del. Philadelphia	50.17	50.17	47.77	38.84
No. 2 fdry., del. Pgh. (N.&S. sides)	47.58	47.58	47.58	37.413
No. 2 fdry., del. Philadelphia	50.67	50.67	48.27	39.34
No. 2 foundry, Chicago	46.25	46.25	43.25	36.00
No. 2 foundry, Valley	46.50	46.50	43.50	36.50
Southern No. 2 Birmingham	43.38	43.38	43.38	34.88
Southern No. 2 del. Cincinnati	49.09	49.09	49.09	37.74
Malleable, Valley	46.50	46.50	43.50	36.50
Malleable, Chicago	46.50	46.50	43.50	36.50
Charcoal, low phos., fob Lyles, Tenn.	66.00	66.00	62.00	50.00
Ferromanganese, f.o.b. Etna, Pa.	163.00	163.00	148.00*	151.00*

* F.o.b. cars Pittsburgh.

Scrap

Heavy melt. steel, No. 1, Pittsburgh	$42.75	$42.75	$42.75	$40.00
Heavy melt. steel, No. 2, E. Pa.	41.50	41.50	41.50	41.625
Heavy melt. steel, No. 1, Chicago	41.75	41.75	41.75	38.75
Heavy melt. steel, No. 1, Valley	42.75	42.75	42.75	39.75
Heavy melt. steel, No. 1, Cleveland	42.25	42.25	42.25	39.25
Heavy melt. steel, No. 1, Buffalo	48.50	48.50	48.15	42.50
Rails for rerolling, Chicago	71.50	69.50	64.50	58.625
No. 1 cast, Chicago	70.50	70.50	71.10	55.875

Coke

Connellsville, beehive furnace	$14.50	$14.50	$14.50	$12.25
Connellsville, beehive foundry	17.00	17.00	17.00	14.50
Chicago, oven foundry, ovens	20.40	20.40	20.40	17.875

FINISHED AND SEMIFINISHED IRON, STEEL PRODUCTS

Finished steel quoted in cents per pound and semifinished in dollars per net ton, except as otherwise noted. Prices apply on an individual producer basis to products within the range of sizes, grades, finishes and specifications produced at its plants.

Semifinished Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, open market, $100-$105 per gross ton. Forging quality, $50 per net ton, mill.

Alloy Steel Ingots: $51 per net ton, mill.

Rerolling Billets, Blooms, Slabs: $52 per net ton, mill, except $62, Conshohocken, Pa.; $66, Monessen, Pa.; sales by smaller interests on negotiated basis at $85 per gross ton, or higher.

Forging Quality Billets, Blooms, Slabs: $61 per net ton, mill, except: $68, Conshohocken, Pa., mill.

Alloy Billets, Slabs, Blooms: Rerolling quality, $63 per net ton, mill except: $70, Conshohocken, Pa.

Sheet Bars: $67 nom., per net ton, mill; sales in open market $110-$115 per gross ton.

Skelp: 3.25c per lb, mill.

Tube Rounds: $76 per net ton, mill; some sellers quoting up to $120 per gross ton.

Wire Rods: Basic and acid open-hearth, 7/32 & $\frac{3}{8}$-inch, inclusive, 3.40c per lb, mill, except: 3.65c, Struthers, O.; 3.70c, Worcester, Mass.; 4.05c, Pittsburg, Calif.; 4.10c, Portsmouth, O., Los Angeles; 4.15c Monessen, Pa. One producer quotes 3.90c, Chicago base. Basic open-hearth and bessemer, not resulphurized, 7/32 to 47/64-inch, inclusive, 3.50c, mill.

Bars

Hot-Rolled Carbon Bars (O.H. only) and Bar-Size Shapes under 3-in. (Base 20 tons one size): 3.35c, mill, except: 3.55c, Ecorse, Mich., Pittsburgh, Monessen, Aliquippa, Pa.; 4.05c, Pittsburg, Torrance, Calif.; 4.10c, S. San Francisco, Los Angeles, Niles, Calif., Portland, Oreg., Atlanta, Seattle; 4.20c, Kansas City, Mo.; 4.25c, Minnequa, Colo.; 5.30c, Fontana, Calif.

Rail Steel Bars: (Base 10 tons): 3.35c, Moline, Ill.; 4.80c, Avis, Pa.; 5.10c, Williamsport, Pa.; another interest quotes 5.35c, mill.

Hot-Rolled Alloy Bars: 3.75c, mill, except: 4.05c, Ecorse, Mich.; 4.80c, Los Angeles; 5.50c, Fontana, Calif.

Hot-Rolled Alloy Bar Shapes: 4.00c, mill.

Cold-Finished Carbon Bars (Base 40,000 lb and over): 4.00c, mill, except: 3.95c, Pittsburgh, Cumberland, Md.; 4.20c, Indianapolis; 4.25c, Monessen, Pa.; 4.30c, Ecorse, Mich.; 4.40c, Newark, N. J., Hartford, Putnam, Conn., Mansfield, Readville, Mass.; 4.45c, Camden, N. J.; 5.30c, Los Angeles.

Cold-Finished Alloy Bars: 4.65c, mill, except: 4.75c, Monessen, Pa.; 4.85c, Indianapolis; 4.95c, Worcester, Mansfield, Mass., Hartford.

High-Strength, Low-Alloy Bars: 5.10c, mill, except; 5.40c, Ecorse, Mich.

Reinforcing Bars (New Billet): 3.35c, mill, except: 3.55c, Monessen, Pa.; 4.05c, Pittsburg, Torrance, Calif.; 4.10c, Atlanta, Seattle, S. San Francisco, Los Angeles; 4.25c, Minnequa, Colo. Fabricated: To consumers: 4.25c, mill, except: 5.00c, Seattle.

Reinforcing Bars (Rail Steel): 4.65c, Williamsport, Pa., mill; another interest quotes 5.35c, mill.

Wrought Iron Bars: Single Refined: 8.60c, (hand puddled), McKees Rocks, Pa.; 9.50c, Economy, Pa. Double Refined: 11.25c (hand puddled), McKees Rocks, Pa., 11.00c, Economy, Pa. Staybolt: 12.75c, (hand puddled), McKees Rocks, Pa.; 11.30c, Economy, Pa.

Sheets

Hot-Rolled Sheets (18 gage and heavier): 3.25c, mill, except: 3.25-3.30c, Cleveland; 3.30c, Pittsburgh; 3.45c, Ecorse, Mich.; 3.95c, Pittsburg, Torrance, Calif.; 5.00c, Conshohocken, Pa.; 5.65c, Fontana, Calif.; 6.25c, Kansas City, Mo.

Hot-Rolled Sheets (19 gage and lighter, annealed): 4.15c, mill, except: 4.40c, Alabama City, Ala.; 4.65c, Niles, O., 5.05c, Torrance, Calif., Kokomo, Ind.

Cold-Rolled Sheets: 4.00c, mill, except: 4.20c, Ecorse, Mich.; 4.70c, Granite City, Ill.; 4.95c, Pittsburg, Calif.

Galvanized Sheets, No. 10: (Based on 5 cent zinc) 4.40c, mill, except: 5.00c, Niles, O.; 5.15c, Pittsburg, Torrance, Calif.; 5.30c, Kokomo, Ind.

Galvannealed Sheets: 4.95c, mill, except: 5.05c, Indiana Harbor, Ind.; 5.55c, Niles, O.; 5.70c, Kokomo, Ind.

Culvert sheets, No. 16 flat Copper Steel (based on 5-cent zinc): 5.00c, mill, except: 5.40c, Granite City, Ill.; 5.45c, Kokomo, Ind.; 5.75c, Pittsburg, Torrance, Calif.

Long Ternes, No. 10 (Commercial quality): 4.80c, mill.

Enameling Sheets, No. 12: 4.40c, mill, except: 4.60c, Granite City, Ill.; 4.70c, Ecorse, Mich.; 6.00c, Niles, O.

Silicon Sheets, No. 24: Field: 5.15c, mill. Armature: 5.45c, mill, except: 5.95c, Warren, O.; 6.05c, Niles, O.

Electrical: Hot-rolled, 5.95c, mill, except: 6.05c, Kokomo, Ind.; 6.15c, Granite City, Ill. 6.45c, Warren, O.; 6.55c, Niles, O.

Motor: 6.70c, mill except: 6.90c, Granite City, Ill.; 7.20c, Warren, O.; 7.95c, Follansbee, W. Va., Toronto, O.; 9.20c, Brackenridge, Pa.

Dynamo: 7.50c, mill, except: 8.65c, Follansbee, W. Va., Toronto, O.; 7.70c, Granite City, Ill.; 10.00c, Brackenridge, Pa.

Transformer 72, 8.05c, mill, except: 9.15c, Follansbee, W. Va., Torronto, O.; 11.80c, Brackenridge, Pa. 65, 8.60c, mill, except: 9.85c, Follansbee, W. Va., Toronto, O.; 12.35c, Brackenridge, Pa.; 58, 9.30c, mill, except: 10.55c, Follansbee, W. Va., Toronto, O.; 13.05c, Brackenridge, Pa.; 52, 10.10c, mill, except: 11.35c, Follansbee, W. Va., Toronto, O.

High-Strength Low-Alloy Sheets: Hot-rolled, 4.95c, mill, except: 5.25c, Ecorse, Mich., and Conshohocken, Pa., mills.

Galvanized (No. 10), 6.75c, mill.

Cold-rolled, 6.05c, mill, except: 6.35c, Ecorse, Mich.

Strip

Hot-Rolled Strip: 3.25c mill, except: 3.30c, Cleveland, Pittsburgh, Riverdale, Ill.; 3.25-3.35c,* Sharon, Pa.; 3.45c, Ecorse, Mich., Atlanta; 3.60c, Detroit; 3.70c, West Leechburg, Pa.; 4.00c, Pittsburg, Torrance, Calif.; 4.25c, Seattle, S. San Francisco, Los Angeles; 4.20c, Kansas City, Mo.; 4.30c, Minnequa, Colo.; 5.00c, Fontana, Calif. One company quotes 4.00c, Pittsburgh base.

* Wider than 6-in. and 6-in. and narrower, respectively.

Cold-Rolled Strip (0.25 carbon and less): 4.00c, mill, except 4.00-4.25c, Warren, O.; 4.00-4.50c, Youngstown; 4.20c, Ecorse, Mich.; 4.25c, Riverdale, Ill.; 4.40-4.50c, Detroit; 4.50c, New Haven, Conn., West Leechburg, New Castle, Pa., Boston; 4.75c, Dover, O., New Kensington, Pa.; 4.50-5.00c, Trenton, N. J.; 4.80-5.05c, Wallingford, Conn.; 5.75c, Los Angeles; 7.10c, Fontana, Calif. One company quotes 4.55c, Cleveland or Pittsburgh base, and 4.75c, Worcester, Mass., base; another, 5.00c, Pittsburgh base.

Cold-Finished Spring Steel: 0.26-0.40 C, 4.00c, mill, except: 4.25c, Dover, O., Chicago; 4.30c, Worcester, Mass.; 4.50c, New Castle, Pa., Boston, Youngstown; 4.75c, Wallingford, Conn. Over 0.40 to 0.60 C, 5.50c, mill, except: 5.65c, Chicago; 5.75c, Dover, O.; 5.80c, Worcester, Mass., Wallingford, Conn., Trenton, N. J.; 5.95c, Boston; 6.00c, New Castle, Pa. Over 0.60 to 0.80 C, 6.10c, mill, except: 6.25c, Chicago; 6.35c, Dover, O.; 6.40c, Worcester, Mass., Wallingford, Bristol, Conn., Trenton, N. J.; 6.60c, New Castle, Pa. Over 0.80 to 1.05 C, 8.05c, mill, except: 7.85c, Dover, O.; 8.20c, Chicago; 8.35c, Worcester, Mass., Bristol, Conn., Trenton, N. J. Over 1.05 to 1.35 C, 10.35c, mill, except: 10.15c, Dover, O.; 10.30c, Wallingford, Conn.; 10.50c, Chicago; 10.65c, Worcester, Mass., Trenton, N. J.

Cold-Rolled Alloy Strip: 9.50c, mill, except: 9.80c, Worcester, Mass.

High-Strength, Low-Alloy Strip: Hot-rolled, 4.95c, mill, except: 5.25c, Ecorse, Mich., mill. Cold-rolled, 6.05c, mill, except: 6.35c, Ecorse, Mich., mill.

Tin, Terne Plate

Tin Plate: American Coke, per base box of 100 lb, 1.25 lb coating $6.60-$6.80; 1.50 lb coating $6.80-$7.00. Pittsburg, Calif., mill $7.35 and $7.55, respectively, for 1.25 and 1.50 lb coatings.

Electrolytic Tin Plate: Per base box of 100 lb, 0.25 lb tin, $5.80-$6.00; 0.50 lb tin, $6.00-$6.20; 0.75 lb tin, $6.20-$6.40.

Can Making Black Plate: Per base box of 100 lb, 55 to 70 lb basis weight, $5.20-$5.30; 75 to 95 lb basis weight $5.10-$5.20; 100 to 128 lb basis weight $5.20-$5.30. $5.95, $5.85, $5.95, respectively, Pittsburg, Calif.

Holloware Enameling Black Plate: 29-gage, 4.75c per pound, except: 4.85c, Sparrows Point, Md.; 4.95c, Granite City, Ill.

Manufacturing Ternes (Special Coated): Per base box of 100 lb, $5.90, except: $6 Fairfield, Ala., Sparrows Point, Md.

Roofing Ternes: Per package 112 sheets; 20 x 28 in., coating I.C. 8-lb, $15.50.

Plates

Carbon Steel Plates: 3.40c, mill, except: 3.40-3.60c, Cleveland; 3.45c, Sparrows Point, Md., Johnstown, Pa., Lackawanna, N. Y.; 3.60c, Pittsburgh; 3.65c, Ecorse, Mich.; 3.75c., Coatesville, Pa.; 3.95c, Claymont, Del., Conshohocken, Pa.; 4.30c, Seattle, Minnequa, Colo.; 4.56c, Houston, Tex.; 5.80c, Fontana, Calif.; 6.50c, Harrisburg, Pa.; 6.25c, Kansas City, Mo.

Floor Plates: 4.55c, mill.

Open-Hearth Alloy Plates: 4.40c, mill, except: 5.10c, Coatsville, Pa., mill.

High-Strength, Low-Alloy Plates: 5.20c mill, except: 5.10c, Coatesville, Pa.; 5.30c, Conshohocken, Pa., Sparrows Point, Md., Johnstown, Pa.; 5.65c, Ecorse, Mich., Sharon, Pa.

Shapes

Structural Shapes: 3.25c, mill, except: 3.30c, Bethlehem, Pa., Lackawanna, N. Y., Johnstown, Aliquippa, Pa.; 3.85c, Torrance, Calif.; 4.15c, Minnequa, Colo.; 4.30c, Seattle, S. San Francisco, Los Angeles; 5.75c, Fontana, Calif.

Alloy Structural Shapes: 4.05c, mill.

Steel Sheet Piling: 4.05c, mill.

High-Strength, Low-Alloy Shapes: 4.95c, mill, except: 5.05c, Bethlehem, Johnstown, Pa., Lackawanna, N. Y.

Wire and Wire Products

Wire to Manufacturers (carloads): Bright, Basic or Bessemer Wire, 4.15c, mill, except: 4.25c, Sparrows Point, Md., Kokomo, Ind.; 4.45c, Worcester, Mass.; 4.50c, Monessen, Pa., Minnequa, Colo., Atlanta, Buffalo; 4.70c, Portsmouth, O.; 4.80c, Palmer, Mass.; 5.10c, Pittsburg, Calif.; 5.15c, S. San Francisco; 5.40c, Shelton, Conn. One producer quotes 4.50c, Chicago base; another, 4.50c, Crawfordsville, Ind., freight equalized with Pittsburgh and Birmingham.

Basic MB Spring Wire, 5.55c, mill except: 5.30c, Portsmouth, O.; 5.65c, Sparrows Point, Md., Monessen, Pa.; 5.85c, Worcester, Palmer, Mass., Trenton, N. J.; 6.50c, Pittsburg, Calif.

Upholstery Spring Wire, 5.20c mill, except: 5.30c, Sparrows Point, Md., Williamsport, Pa.; 5.50c, Worcester, Mass., Trenton, N. J., New Haven, Conn.; 6.15c, Pittsburg, Calif.

Wire Products to Trade (carloads): Merchant Quality Wire: Annealed (6 to 8 Gage base), 4.80c, mill, except: 4.90c, Sparrows Point, Md.; 4.95c, Monessen, Pa.; 5.10c, Worcester, Mass.; 5.15c, Minnequa, Colo., Kokomo, Ind.; 5.20c, Atlanta; 5.75c, S. San Francisco, Pittsburg, Calif. One producer quotes 5.15c, Chicago and Pittsburgh base; another, 5.20c. Crawfordsville, Ind., freight equalized with Pittsburgh and Birmingham.

Galvanized (6 to 8 Gage base), 5.25c, mill, except: 5.35c, Sparrows Point, Md.; 5.40c, Monessen, Pa.; 5.55c, Worcester, Mass.; 5.60c, Kokomo, Ind., Minnequa, Colo.; 5.65c, Atlanta; 6.20c, Pittsburg, S. San Francisco, Calif. One producer quotes 5.60c, Pittsburgh and Chicago base; another, 5.65c, Crawfordsville, Ind., freight equalized with Birmingham and Pittsburgh.

Nails and Staples: Standard, cement-coated and galvanized nails and polished and galvanized staples, Column 103, mill, except: 105, Sparrows Point, Md., Kokomo, Ind.; 109 Worcester, Mass.; 110 Minnequa, Colo., Atlanta; 117, Portsmouth, O.; 123, Pittsburg, Calif.; 124, Cleveland; 126, Monessen, Pa.; $6.75 per 100 pound keg, Conshohocken, Pa., Wheeling, W. Va. One producer quotes column 109, Chicago and Pittsburgh base; another, column 113, Crawfordsville, Ind., freight equalized with Birmingham and Pittsburgh.

Woven Fence (9 to 15½ Gage, inclusive): Column 109, mill, except: 113, Monessen, Pa., Kokomo, Ind.; 116, Minnequa, Colo.; 121 Atlanta; 132, Pittsburg, Calif. One producer quotes column 113, Pittsburgh and Chicago base; another column 114, Crawfordsville, Ind., freight equalized with Pittsburgh and Birmingham.

Barbed Wire: Column 123 mill, except: 125, Sparrows Point, Md., Kokomo, Ind.; 126, Atlanta; 128, Monessen, Pa.; 130, Minnequa, Colo.; 143, Pittsburg, Calif.; 145, S. San Francisco. One producer quotes 127, Chicago and Pittsburgh base.

Fence Posts (with clamps): Column 114, Duluth; 115, Johnstown, Pa.; 116, Moline, Ill.; 122, Minnequa, Colo.; $123.50 per net ton, Williamsport, Pa.

Bale Ties (single loop): Column 106, mill, except: 108, Sparrows Point, Md., Kokomo, Ind.; 110, Atlanta; 113 Minnequa, Colo.; 130, S. San Francisco, Pittsburg, Calif. One producer quotes column 115, Crawfordsville, Ind., freight equalized with Birmingham and Pittsburgh.

Stainless Steels

(Mill prices, cents per pound)

CHROMIUM NICKEL STEELS

Type No.	Bars, Wire Shapes	Strip, Cold-Rolled	Sheets
301	28.50-28.75	30.50-32.00	37.50-40.75
302	28.50-28.75	33.00-33.75	37.50-40.75
303	31.00-31.50	36.50-39.75	39.50-43.00
304	30.00-31.25	35.00-35.75	39.50-43.00
316	46.00-48.00	55.00-57.25	53.00-57.25
347	38.50-39.75	48.50-50.25	50.00-54.00

STRAIGHT CHROMIUM STEELS

410	22.75-23.00	26.50-27.00	32.00-33.00
416	23.25-23.50	28.25-33.50	32.50-33.50
430	23.25-23.50	27.00-27.50	34.75-35.50
446	32.50-33.00	60.00-62.25	46.50-50.00

STAINLESS-CLAD STEELS

	Plates —Cladding— 10%	20%	Sheets —Cladding— 10%	20%
302	....	....	19.75	21.50
304	22.50	26.50	20.75	22.50
310	32.50	36.50	....	....
316	27.00	31.00	26.00	28.00
321	23.50	27.50	....	....
347	25.00	29.00	24.00	26.00
405	18.75	24.75	....	....
410	18.25	24.25	....	....
430	18.25	24.25	....	....

TOOL STEELS

Tool Steel: Cents per pound, producing plants: reg. carbon 19.00c; extra carbon 22.00c; special carbon 26.50c; oil-hardening 29.00c; high carbon-chromium 52.00c; chrome hot work, 29.00c.

W	Cr	V	Mo	Co	Base Per lb
18	4	1	...	...	90.50c
18	4	2	...	...	102.50c
18	4	3	...	...	114.50c
18	4	2	...	9	168.50c
1.5	4	1	8.5	...	65.00c
6.4	4.5	1.9	5	...	69.50c
6	4	3	6	...	88.00c

Tubular Goods

Standard Steel Pipe: Mill prices in carlots, threaded and coupled, to consumers about $200 a net ton.

In.	Butt Weld Blk.	Gal.	In.	Butt Weld Blk.	Gal.
⅛	39½–	10–	1 ——.	46–	26–
	41½	12½		48½	27
¼	37½–	11½–	1¼ ...	46½–	26½–
	39½	14		49	28
⅜	34–	6½–	1½ ...	47–	27–
	36	9		49½	28½
			2	47½–	27½–
½	40½–	19–		50	29
	43	21½	2½, 3..	48–	28–
¾	43½–	23–		50½	29½
	46	24½	3½ & 4	44½	22½

In.	Lap Weld Blk.	Gal.	Elec. Weld Blk.	Gal.	Seamless Blk.	Gal.
2	39½	17½	38½	16½	27–	5–
					38½	17
2½ ..	42½–	20½–	41½	19½	32½–	10½–
	43½	22½			41½	20
3	42½–	20½–	41½	19½	35–	13–
	43½	22½			42½	21½
3½ &4	42½–	21–	43½	21½	38½–	16½–
	46½	24½			43½	22
5 & 6	42½	24½	43½	21½	38½–	16½–
	44½	22½			43½	22
7	....	....	....	....	43½	20½

Line Steel Pipe: Mill prices in carlots to consumers about $200 a net ton.

In.	Butt Weld Blk.	Gal.	In.	Butt Weld Blk.	Gal.
⅛	40½	....	1¼ ...	46–	26–
¼	38½	....		48	27
⅜	35	....	1½ ...	46½–	26½–
½	40–	18½–		48½	27½
	42	19½	2	47–	26½–
¾	43–	22½–		49	28
	45	23	2½ & 3	47½–	27–
1	45½–	25½–		49½	28½
	47½	26	3½ & 4	43½	....

In.	Lap Weld Blk.	Gal.	Elec. Weld Blk.	Gal.	Seamless Blk.	Gal.
2	38½	16½	37½	15½	26–	4–
					37½	16
2½ ..	42½	20½	40½	19½	31½–	9½–
					40½	19
3 ...	42½	20½	40½	19½	34–	12–
					40½	19
3½-4.	41½–	20–	42½	20½	37½–	15½–
	45½	23½			42½	21
5 & 6.	41½–	20	42½	20½	37½–	15½–
	43½				42½	21
8 ...	45½	....	44½	21½–	40½–	17½–
				22	44½	22
10 ..	45	....	44	21–	41½–	18½–
				21½	44	21½
12 ..	44	....	43	20	40½–	17½–
					43	20½

Standard Wrought Iron Pipe: Mill price in carlots, threaded and coupled, to consumers about $200 a net ton.

In.	Butt Weld Bulk	Gal.	In.	Lap Weld Bulk	Gal.
⅜...	+59½	+90½	1¼..	+22	+48
½...	+20½	+47½	1½..	+15½	+40½
¾...	+10½	+36½	2....	+ 7½	+31½
1 and			2½-3½	+ 5	+27
1¼	+ 4½	+27½	4....	List	+21
1½..	— 1½	+24	4½-8	+ 2	+22½
2....	— 2	+23½	9-12.	+12	+32

Boiler Tubes: Net base c.l. prices, dollars per 100', mill; minimum wall thickness, cut lengths 4 to 24"; inclusive.

(Following prices on seamless boiler tubes raised 10% by Babcock & Wilcox Tube Co. as of Nov. 22.)

O.D. In.	B.W. Ga.	Seamless Hot Rolled	Seamless Cold Drawn	Elec. Weld Hot Rolled	Elec. Weld Cold Drawn
1	13	....	13.39	13.00	13.00
1¼	13	....	15.87	13.21	15.39
1½	13	$15.05	17.71	14.60	17.18
1¾	13	17.11	20.15	16.60	19.54
2	13	19.18	22.56	18.60	21.89
2¼	12	23.54	27.70	22.83	26.88
2½	12	25.79	30.33	25.02	29.41
2¾	12	27.33	32.14	26.51	31.18
3	12	28.68	33.76	27.82	32.74
3¼	11	33.39	39.29	32.39	38.11
3½	11	35.85	42.20	34.78	40.94
4	10	44.51	52.35	43.17	50.78

Pipe Cast Iron: Class B, 6-in. and over, $93.50 per net ton, Birmingham; $106.70, del. Chicago; 4-in. pipe, $5 higher; Class A pipe, $5 a ton over Class B.

Rails, Supplies

Rails: Standard, over 60-lb; $3.20 per 100 lb, mill, except: $3.50, Indiana Harbor, Ind.

Light (billet): $3.55 per 100 lb, mill, except: $4.25, Minnequa, Colo.

Light (rail steel): $5.10 per 100 lb, Williamsport, Pa.

Railroad Supplies: Track bolts, treated: $8.50 per 100 lb, mill. Untreated: $8.25, mill.

Tie Plates: 4.05c mill, except: 4.20c, Pittsburg, Calif.; 4.50c, Seattle.

Splice Bars: 4.25c, mill.

Standard Spikes: 5.35c, mill, except: 5.25c, Pittsburgh.

Axles: 5.20c, mill.

RAW MATERIAL AND FUEL PRICES

Minimum delivered prices do not include 3 per cent federal tax.

Pig Iron

Per Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem, Pa., furnace	$48.00	$48.50	$49.00	$49.50
Newark, N. J., del.	50.39	50.89	51.39	51.89
Brooklyn, N. Y., del.	....	52.40	52.90	....
Philadelphia, del.	50.17	50.67	51.17	51.67
Birmingham, furnace	42.88	43.38	....	....
Cincinnati, del.	....	49.09	....	....
Buffalo, furnace	*47.00	*47.00	*47.50	48.00
Boston, del.	55.42	55.42	55.92	....
Rochester, del.	49.22	49.22	49.72	50.22
Syracuse, del.	50.025	50.025	50.525	41.025
§Chicago, district furnaces	46.00	46.00-46.50	46.50	47.00
Milwaukee, del.	47.72	47.72-48.22	48.22	48.72
Muskegon, Mich., del.	....	50.98-51.48	51.48	....
Cleveland, furnace	46.00	46.50	46.50	47.00
Akron, del.	48.17	48.67	48.67	49.17
Lone Star, Tex., furnace	....	†75.00	....	....
Duluth, furnace	....	46.00	46.50	47.00
Erie, Pa., furnace	45.50	46.00	46.50	47.00
Everett, Mass., furnace	....	49.50	50.00	....
Geneva, Utah, furnace	46.00	46.50	....	....
Seattle, Tacoma, Wash., del.	....	53.63	....	....
Portland, Oreg., del.	....	53.63	....	....
Los Angeles, San Francisco	53.13	53.63	....	....
Granite City, Ill., furnace	47.90	48.40	48.90	....
St. Louis, del.	48.65	49.15	49.65	....
Ironton, Utah, furnace	....	46.50	....	....
‡Neville Island, Pa., furnace	46.00	46.50	46.50	47.00
Pittsburgh, del., N.&S. Sides	47.08	47.58	47.58	48.08
Pittsburgh (Carnegie), furnaces	46.00	....	....	47.00
Sharpsville, Pa., furnace	46.00	46.50	46.50	47.00
Steelton, Pa., furnace	48.00	48.50	49.00	49.50
Struthers, O., furnace	42.50	....	....	....
Swedeland, Pa., furnace	50.00	50.50	51.00	....
Toledo, O., furnace	45.50	46.00	46.50	47.00
Cincinnati, del.	50.05	50.55	....	....
Youngstown, O., furnace	46.00	46.50	46.50	47.00
Mansfield, O., del.	49.87	50.37	50.37	50.87

* Republic Steel Corp. quotes $1 a ton higher for basic, No. 2 foundry and malleable at Buffalo.

† Low phosphorus southern grade.

‡ To Neville Island base add: $0.86 for McKees Rocks, Pa.; $1.31 Lawrenceville, Homestead, McKeesport, Monaco; $1.73 Verona; $1.94 Brackenridge; $1.08 for Ambridge and Aliquippa.

§ Includes, in addition to Chicago, South Chicago, Ill., East Chicago, Gary and Indiana Harbor, Ind.

Blast Furnace Silvery Pig Iron

6.00-6.50 per cent Si (base) $59.50
6.51-7.00 .. 60.75 9.01- 9.50 67.00
7.01-7.50 .. 62.00 9.51-10.00 68.25
7.51-8.00 .. 63.25 10.01-10.50 69.50
8.01-8.50 .. 64.50 10.51-11.00 70.75
8.51-9.00 .. 65.75 11.01-11.50 72.00
F.o.b. Jackson, O., per gross ton. Buffalo furnace $1.25 higher.

Bessemer Ferrosilicon

Prices same as for blast furnace silvery iron, plus $1 per gross ton.

Electric Furnace Silvery Pig Iron Si 14.01-14.50%, $84.75 furnace, Niagara Falls; $84 open-hearth and $85 foundry grade, Keokuk, Iowa. Add $1 a ton for each additional 0.5% Si to 18%; 50c for each 0.5% Mn over 1%; $1 a ton for 0.045% max. phos.

Charcoal Pig Iron

Semi-cold blast, low phosphorus. F.o.b. furnace, Lyles, Tenn. ..$66 (For higher silicon iron a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Low Phosphorus

Steelton, Pa., $54; Buffalo, Troy, N. Y., $50. Philadelphia, $56.81 delivered.

Intermediate phosphorus, Central furnace, Cleveland, $51.

Differentials

Prices are subject to following differentials:

Silicon: An additional charge of 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

Manganese: An additional charge of 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Fluorspar

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more $37; less than 60% $34.

Metallurgical Coke

Price per Net Ton

Beehive Ovens

Connellsville, furnace	$13.50-15.50
Connellsville, foundry	16.00-18.00
New River, foundry	16.50
Wise county, foundry	15.35
Wise county, furnace	14.60

Oven Foundry Coke

Kearney, N. J., ovens	$21.50
Chicago, ovens	20.40
Chicago, del.	†21.75
Detroit, del.	23.95
Terre Haute, ovens	21.00
Milwaukee, ovens	21.15
Indianapolis, ovens	20.85
Chicago, del.	24.00
Cincinnati, del.	21.40
Detroit, del.	24.40
Ironton, O., ovens	18.25
Painesville, O., ovens	20.90
Erie, del.	22.57
Cleveland, del.	22.46
Buffalo, del.	23.25
Birmingham, ovens	17.70
Philadelphia, ovens	20.55
Swedeland, Pa., ovens	20.50
Portsmouth, O., ovens	19.25
Detroit, ovens	20.65
Detroit, del.	*21.65
Flint, del.	22.85
Pontiac, del.	21.91
Saginaw, del.	23.15

Includes representative switching charge of: *, $1; †, $1.35.

Coal Chemicals

Spot, cents per gallon, ovens

(Price effective as of Aug. 5)

Pure benzol	20.00
Toluol, one degree	20.50-26.50
Toluol, two degrees	23.00-26.50
Industrial xylol	20.50-26.50

Per ton, bulk, ovens

Sulphate of ammonia	$45.00

Per pound, ovens

(Effective as of Oct. 1)

Phenol, 40 (car lots, returnable drums)	13.50
Do., less than carlots	14.25
Do., tank cars	12.50

(Effective as of Oct. 25)

Naphthalene flakes, balls, bbl to jobbers, "household use"	13.75

Refractories

(Prices per 1000 brick, f.o.b. plant)

Fire Clay Brick

Super Duty: St. Louis, Vandalia, or Farber, Mo., Olive Hill, Ky., Clearfield, or Curwensville, Pa., $100.

High-Heat Duty: Salina, Pa., $85; Woodbridge, N. J., St. Louis, Farber, or Vandalia, Mo., West Decatur, Orviston, Clearfield, Beach Creek, or Curwensville, Pa., Olive Hill, Hitchins, Haldeman, or Ashland, Ky., Troup, or Athens, Tex., Stevens Pottery, Ga., Portsmouth, or Oak Hill, O., $80.

Intermediate-Heat Duty: St. Louis, or Vandalia, Mo., West Decatur, Orviston, Beach Creek, or Clearfield, Pa., Olive Hill, Hitchins, Haldeman, or Athens, Ky., Troup, Tex., Stevens Pottery, Ga., or Portsmouth, O., $74.

Low-Heat Duty: Oak Hill, or Portsmouth, O., Clearfield, Pa., Bessemer, Ala., $66.

Ladle Brick

Dry Press: $55, Freeport, Merill Station, Clearfield, Pa.; Chester, New Cumberland, W. Va.; Irondale, Wellsville, O.

Wire Cut: $53, Chester, New Cumberland, W. Va.; Wellsville, O.

Malleable Bung Brick

St. Louis, Mo., Olive Hill, Ky., $83; Beach Creek, Pa., $73.

Silica Brick

Mt. Union, Claysburg, or Sproul, Pa., Ensley, Ala., $80; Hays, Pa. $85; Joliet or Rockdale, Ill., $89; Lehi, Utah, Los Angeles, $95.

Eastern Silica Coke Oven Shapes: Claysburg, Mt. Union, Sproul Pa., $80.

Illinois Silica Coke Oven Shapes: Joliet or Rockdale, Ill., $81.

Basic Brick

(Base prices per net ton; f.o.b. works, Baltimore or Chester, Pa.)

Chrome brick or chemical-bonded chrome brick, $69, magnesite brick, $91; chemical-bonded magnesite, $80.

Magnesite

(Base prices per net ton, f.o.b. works, Chewelah, Wash.)

Domestic dead-burned, ¾" grains: Bulk, $31; single paper bags $35.50.

Dolomite

(Base prices per net ton)

Domestic, dead-burned bulk: Billmeyer, Blue Bell, Williams, Plymouth Meeting, Pa., Millville, W. Va., Nario, Millersville, Martin, Gibonsburg, Woodville, O., $11.85; Thornton, McCook, Ill., $11.95; Dolly Sliding, Bonne Terre, Mo., $12.05.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (natural) Lower Lake Ports

(Any increase or decrease in R. R. freight rates, dock handling charges and taxes thereon effective after Apr. 1, 1948, are for buyer's account.)

Old range bessemer	$6.60
Old range nonbessemer	6.45
Mesabi bessemer	6.35
Mesabi nonbessemer	6.20
High phosphorus	6.20

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56.62% contract	15.25

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%	14.50
Brazil iron ore, 68-69%	19.50

Tungsten Ore

Wolframite and scheelite per short ton unit, duty paid	$26-$28

Manganese Ore

48-50%, duty paid, f.o.b. cars, New York, Philadelphia, Baltimore, Norfolk, Va., Mobile, Ala., New Orleans, 67.60c-72.60c.

Chrome Ore

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S.C., plus ocean freight differential for delivery to Portland, Oreg., and/or Tacoma, Wash. (S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	$37.50
48% 3:1	39.00
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	$25.50-$26.00
45% no ratio	26.50
48% no ratio	29.00-30.00
50% no ratio	29.50-30.50
Brazilian—nominal	
44% to 2.5:1 lump	$33.65
Rhodesian	
45% no ratio	$27-$27.50
48% no ratio	30.00
48% 3:1 lump	39.00
Domestic (seller's nearest rail)	
48% 3:1	$39.00

Molybdenum

Sulphide conc., lb, Mo., cont., Mines	$0.75

WAREHOUSE STEEL PRICES

Prices, cents per pound, for delivery within switching limits, subject to extras.

	SHEETS			STRIP		BARS				PLATES	
	H-R 10 Ga.	C-R 17 Ga.	Gal. *10 Ga.	†H-R	†C-R	H-R Rds. ⅜" to3"	C-F Rds. ½" & up	H-R Alloy **4140	Standard Structural Shapes	Carbon ⅜"-¾"	Floor ¾" & Thicker
Boston (city)	5.84	6.64	7.84	6.04	6.90	5.69	6.39	8.24-9.74	5.54	5.89	7.34
Boston (c'try)	5.69	6.49	7.69	5.89	6.75	5.54	6.24	8.09-9.59	5.39	5.74	7.19
New York (city)	5.73-5.80	6.73	7.74-7.83	6.08-6.28	...	5.73	6.58	8.67	5.52-5.78	5.98	7.48
New York(c'try)	5.53-5.60	6.53	7.54-7.63	5.88-6.08	...	5.53	6.38	...	5.32-5.58	5.78	7.28
Phila. (city)	5.50-5.86	6.61-6.81	7.42-7.62	5.46-5.81	...	5.57-5.65	6.31	8.39	5.24-5.40	5.52-5.65	6.73-7.16
Phila. (c'try)	5.35-5.71	6.46-6.66	7.27-7.47	5.31-5.66	...	5.42-5.50	6.16	8.24	5.09-5.25	5.37-5.50	6.58-7.01
Balt. (city)	5.43†	6.33	7.18	5.49	...	5.54	...	...	5.48	5.68	7.13
Balt. (c'try)	5.28†	6.18	7.03	5.34	...	5.39	...	...	5.33	5.53	6.98
Norfolk, Va.	5.75	...	...	...	...	6.00	7.00	...	6.00	6.00	7.50
Wash. (w'hse)	5.81-5.97	...	...	5.87	...	5.88-5.92	6.58	...	5.82-5.86	6.02-6.06	7.47-7.51
Buffalo (del.)	5.20-5.25	5.95-6.00	7.75	5.70	6.50	5.35	6.05	9.50	5.25	5.60	7.70
Buff. (w'hse)	5.05-5.10	5.80-5.85	7.60	5.55	6.35	5.20	5.90	9.40	5.10	5.45	7.55
Pitts. (w'hse)	4.85-5.00§	5.75-5.85[3]	7.15-7.70	5.00-5.35	5.95-6.00	4.90-5.10	5.65	7.65	4.90-5.15	5.05-5.25	6.55
Det. (w'hse)	4.85-5.00§	5.75-5.85[3]	7.15	5.00-5.35	5.95-6.00	5.45	6.17	8.12	5.45	5.65-5.80	7.10
Cleveland (del.)	5.13-5.90‡‡	5.90-6.29	7.34-8.00‡‡	5.17-5.69	6.45-6.85	5.30-5.35	6.05-6.10	8.24-8.54	5.34-5.60	5.50-5.55	6.95-7.00
Cleve. (w'hse)	4.98-5.75	5.75-6.14	7.19-7.85	5.02-5.54	6.30-6.70	5.15-5.20	5.90-5.95	8.09-8.39	5.19-5.45	5.35-5.40	6.80-6.85
Cincin. (w'hse)	5.26	6.11	7.60	5.52	6.07	5.52	6.07	...	5.37	5.61	6.91
Chicago (city)	5.00-5.20	5.90‡[3]	7.30	5.00	6.64-6.80	5.05	5.85	8.25[3]	5.05	5.25	6.70
Chicago (w'hse)	4.85-5.05	5.75‡[3]	7.15	4.85	6.49-6.65	4.90	5.70	8.10[3]	4.90	5.10	6.55
Milwaukee (city)	5.37	6.07‡[3]	7.47	5.17	6.81-6.97	5.22	6.02	8.42[3]	5.22	5.42	6.87
St. Louis (del.)	5.34§	6.24[3]	7.44	5.34	6.64	5.39	6.19[12]	6.64	5.39	5.59	7.04
St. L. (w'hse)	5.19§	6.09[3]	7.29	5.19	6.49	5.24	6.04[12]	9.49	5.24	5.44	6.89
Birm'ham (city)	5.20§	...	6.60	5.20	...	5.15	6.66	...	5.15	5.40	7.41-7.66
Birm'ham(c'try)	5.05§	...	6.45	5.05	...	5.00	6.51	...	5.00	5.25	7.26-7.51
Omaha, Nebr.	6.07	...	9.33	6.07	...	6.12	6.92	...	6.12	6.32	7.77
Los Ang. (city)	6.55§	8.05	8.20†	6.75	9.50	6.20	8.00-8.50	...	6.70	6.40	8.15
Los Angeles (w'hse)	6.40§	7.90	8.05†	6.60	9.35	6.05	7.85-8.35	...	6.55	6.25	8.00
San Francisco	5.95[21]	7.15	8.05	6.75[21]	8.25[18]	5.90[21]	7.55	10.20‡‡	5.90	7.60	8.10
Seattle-Tacoma	6.35[17]	7.90[5]	8.40	6.70[17]	...	6.20[17]	8.15[1]	9.45[3]	6.30[17]	6.35[17]	8.40[17]

Base Quantities: 400 to 1999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold finished bars, 1000 lb and over; galvanized sheets, 450 to 1499 lb; [1]—1500 lb and over; [2]—1000 to 4999 lb; [3]—450 to 39,999 lb; [4]—three to 24 bundles; [5]—450 to 1499 lb; [6]—400 to 1499 lb; [8]—400 to 1499 lb; [9]—1000 to 1999 lb; [11]—1000 to 39,999 lb; [12]—1000 lb and over; [18]—2000 lb and over; [17]—300 to 999 lb; [18]—1500 to 1999 lb; [19]—1500 to 39,999 lb; [20]—400 to 3999 lb; [21]—400 lb and over; [23]—500 to 1499 lb; [23]—Price (but not other price in range) applies to any and all quantities.

* Includes gage and coating extra, except Birmingham (coating extra excluded); † does not include gage extras; ‡ 15 gage; § 18 gage and heavier. ** as rolled; †† add 0.40 for sizes not rolled in Birmingham; ‡‡ top level of quoted range is nominal.

Bolts, Nuts

Prices to consumers, f.o.b. midwestern plants. Sellers reserve right to meet competitors' prices, if lower. Additional discounts on carriage and machine bolts, 5 for carloads; 15 for full containers, except tire and plow bolts.

Carriage and Machine Bolts

½-in. and smaller; up to 6 in. in length.	35 off
⅝ and ⅝ x 6-in. and shorter	37 off
¾-in. and larger x 6-in. and shorter	34 off
All diameters longer than 6-in.	30 off
Tire bolts	25 off
Plow bolts	47 off
Lag bolts, 6 in. and shorter	37 off
Lag bolts, longer than 6 in.	35 off

Stove Bolts

In packages, nuts separate, 58½-10 off; bulk 70 off on 15,000 of 3-in. and shorter, or 5000 over 3 in., nuts separate.

Nuts

	A.S. Light	A.S. f.o.b. Reg. and Heavy
Semifinished hexagon	41 off	.....
⅛-in. and smaller	.....	38 off
¼-in.-1-in.	39 off	.....
1⅛-in.-1⅛-in.	.....	37 off
1¼-in.-1½-in.	37 off	35 off
1⅝-in. and larger	34 off	28 off

Additional discount of 15 for full containers.

Hexagon Cap Screws (Packaged)

Upset 1-in. smaller by 6-in. and shorter (1020 bright)	46 off
Upset (1035 heat treated)	
⅝ and smaller x 6 and shorter	40 off
⅞, ⅞, & 1 x 6 and shorter	35 off

Square Head Set Screws

Upset 1-in. and smaller	51 off
Headless, ¼-in. and larger	31 off

Rivets

F.o.b. midwestern plants

Structural ½-in. and larger	6.75c
⅞-in. and under	48 off

Washers, Wrought

F.o.b. shipping point, to jobbers..Net to $1 off

FERROALLOY PRODUCT PRICES

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si) Carlot per gross ton, $57, Palmerton, Pa.; $66, Pittsburgh and Chicago; (16% to 19% Mn.) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $160 per gross ton of alloy, c.l., packed, $172; gross ton lots, packed, $187; less gross ton lots, packed, $204; f.o.b. Alloy, W. Va., Niagara Falls, N. Y.; or Welland, Ont. Base price; $165, Rockwood, Tenn.; $162, f.o.b. Birmingham and Johnstown, Pa., furnaces; $160, Sheridan, Pa.; $163, Aetna, Pa. Shipment from Pacific Coast warehouses on one seller add $31 to above prices, f.o.b. Los Angeles, San Francisco, Portland, Oreg. Shipment from Chicago warehouse, ton lots, $201; less gross ton lots, $218 f.o.b. Chicago. Add or subtract $2 for each 1%, or fraction thereof, of contained manganese over 82% and under 78%.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Carload, lump, bulk, max. 0.10% C, 24.75c per lb of contained Mn, carload packed 26.0c, ton lot 27.1c, less ton 28.3c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 0.75% C—max. 7% Si. **Special Grade:** (Mn 90% approx., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max., Si 1.5% max.). Carload, lump, bulk 18.15c per lb of contained Mn, carload packed 18.9c, ton lot 20.0c, less ton 21.2c, Delivered. Spot, add 0.25c.

Manganese Metal: (Mn 96% min., Fe 2% max., Si 1% max., C 0.20% max.). Carload, 2" x D, packed 35.5c per lb of metal, ton lot 37c, less ton 39c. Delivered. Spot, add 2c.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk, 1.50% C grade, 18-20% Si, 8.6c per lb of alloy, carload packed, 9.35c, ton lot 10.25c, less ton 11.25c. Freight allowed. For 2% C grade, Si 15-17.5%, deduct 0.2c from above prices. Spot, add 0.25c.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 20.5c per lb of contained Cr, c.l., packed 21.4c, ton lot 22.55c, less ton 23.95c. Delivered. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

Foundry Ferrochrome: (Cr 62-66%, C 5-7%). Contract, c.l., 8MxD, bulk 22.0c per lb of contained Cr, c.l., packed 22.9c, ton 24.25c, less ton 26.0c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Contract, carload, lump, bulk, max. 0.03% C 31.85c per lb of contained Cr, 0.04% C 29.75c, 0.05% C 29.25c, 0.06% C 28.75c, 0.10% C 28.25c-28.5c, 0.15% C 28.0c, 0.20% C 27.75c, 0.50% C 27.5c, 1% C 27.25c, 2% C 27.0c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

"SM" Low-Carbon Ferrochrome: (Cr 62-66%, Si 4-6%, Mn 4-6%, add C 1.25% max.). Contract, carload, lump, bulk 27.75c per lb of contained chromium, carload, packed 28.85c, ton lot 30.05c, less ton 31.85c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. Add 5c for each 0.25% of N above 0.75%.

Chromium Metal: (Mn 97% Cr and 1% Fe). Contract, carload, 1" x D; packed, max. 0.50% C grade, $1.03 per lb of contained chromium, ton lot $1.05, less ton $1.07. Delivered. Spot, add 5c.

SILICON ALLOYS

20-30% Ferrosilicon: Contract, carload, lump, bulk, 16.50-17.50c per lb of contained Si; packed 18.90c; ton lots 20.00c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 10.5c per lb of contained Si, carload

(*Please turn to Page 200*)

Proposes Larger Metal Stockpile

Bureau of Mines official says government's stockpile objectives should be greatly expanded. Cites our increasing dependence on foreign sources.

New York — Elmer W. Pehrson, chief, Economics & Statistics Division, Bureau of Mines, said recently that the government's stockpile objectives should be greatly expanded. In his address before the Mining & Metallurgical Society of America, he said that we would be wise to husband our irreplaceable mineral resources so as to derive the greatest ultimate national benefit from them. He said the conservation plank in our national mineral policy should encourage research to make conservation practical through better techniques and economic research so that we may evaluate the added cost of more efficient use of minerals against the long-range conservational gains.

Mr. Pehrson added that "the need for constructive action to assure an adequate supply of minerals from abroad is no less acute than that for improving domestic production. Our dependence on foreign sources is increasing, while free access thereto becomes increasingly difficult."

Copper — Copper mine production dropped 5 per cent in September, but on a daily average basis declined only 2 per cent, according to the Bureau of Mines. The continuing inability of Northern Rhodesian producers to get adequate supplies of coal resulted in further curtailment during the month at some of the properties there and promised an immediate reduction in world copper supplies, the Bureau said.

The longshoremen's strike will also affect the amount of metal available to consumers in this country. Although the strike has ended, allowing the movement of 10,000 to 15,000 tons which had been tied up, consumers will not feel the effects of the strike damage until January, according to trade reports. The first boat did not start its return trip to Chilean ports until the end of last week and will not return here with a cargo of copper until late in the last week of January, or too late to make delivery in that month. It had been expected that about 30,000 tons of South American copper would be received in the first month of next year. Domestic supplies are also being curtailed by the prolonged strike at Kennecott Copper Corp. properties in Utah.

Lead — Due to delay in arrival of foreign lead as a result of the longshoremen's strike and the withdrawal of tonnages for the government's permanent stockpile, consumers will experience a tighter lead market during December and January. At least one large producer has notified consumers of a cut in allotments for delivery this month.

The average daily rate of lead output from domestic mines increased 19 per cent in September, according to the Bureau of Mines. The gain was due largely to resumption of operations at previously strike-bound lead-producing properties in southeastern Missouri and in the Tri-State district. September lead output in terms of recoverable metal was 26,347 short tons compared with 22,853 tons in August. Smelters' recovery of secondary lead, tin and antimony from purchased lead and tin-base scrap in August gained 21 per cent over recovery in July to a total of 40,174 tons. Compared with the preceding month, August receipts of lead scrap were up 15 per cent, consumption 19 per cent, and stocks almost 6 per cent.

Zinc — Applicants for the purchase of zinc from the Office of Metals Reserve stocks have been notified that no more materials will be made available. The purpose of this action is to hold all OMR stocks for transfer to government strategic stockpile but such transfer has as yet not been made nor have definite steps been taken in that direction. RFC officials said that there are about 21,000 tons of zinc, most of it high grade, remaining in OMR reserves.

Metal Price Averages For November

(Cents per pound)

Electrolytic Copper, del. Conn.	23.500
Lead, St. Louis	21.325
Prime, Western Zinc, E. St. Louis	16.580
Straits Tin, New York	103.000
Primary Aluminum Ingots, del.	17.000
Antimony, f.o.b. Laredo, Tex.	38.500
Nickel, f.o.b. refinery	40.000
Silver, New York	73.655

Tin — Following the end of the longshoremen's strike, unloading of foreign metal was resumed. However, the effects of the strike will be felt well into 1949, although consumers' operations should be maintained uninterruptedly by falling back on reserves.

Silver — Handy & Harman lowered its official silver price to 70.00c last week, the lowest recorded since Sept. 3, 1947. This compares with 74.75c at the beginning of November and an average of 77.226c for October. Weakness in the market is attributed to offerings of Mexican silver by other than regular primary producers during the past several days. This, coupled with a decline in demand from some consumers who have completed their output goals to take care of the holiday requirements, has moved the supply position to a point well in excess of the current demand.

Offers To Buy Uranium Ores

Grand Junction, Colo.—The Rifle Colorado plant of the United States Vanadium Corp. offers to purchase uranium-bearing ores, which are amenable to the Rifle process, from independent miners under provisions of a new three-year contract between the company and the U. S. Atomic Energy Commission. Up to this time, the only ores processed at the Rifle plant have been from company-owned mines. As a result of the new contract, production at the Rifle plant is expected to be stepped up immediately and may perhaps be doubled.

Brass Ingot Output Gains

Washington — Brass ingot production which had decreased 24 per cent to 20,848 short tons in July increased 21 per cent in August to 25,315 tons, according to the Bureau of Mines. The increase was expected because the low production in July was not caused by any lowering of demand for ingot, but by vacation reductions in the labor force and plant shut downs. Increases in prices for copper, lead and zinc, which took place at the end of July, were reflected both in prices smelters paid for scrap and in those they received for ingot, but output was not much below the monthly average for the elapsed portion of 1948 and was probably about the same as it would have been if the price increases had not occurred.

Secondary copper smelters consumed 33,933 tons of copper scrap in August compared with 26,800 tons in July and 34,541 tons in June. Consumption of composition scrap was 8,646 tons, or 1046 tons more than in July and 797 tons less than in June. Treatment of yellow brass increased 2119 tons in August after decreasing 2258 tons in July. The corresponding figures for No. 2 wire, mixed heavy, and light copper scrap were 1324 tons and 930 tons. The August increases in the use of low-grade scrap and in bronze were comparable to their July decreases.

Output of most ingot items which had undergone large decreases in July increased by substantial amounts in August but production of tin bronze (88-10-2) declined 1 per cent following a 15 per cent decrease in July and that of high-leaded tin bronze (75-5-20) after declining 5 per cent in July decreased 54 per cent in August.

Canadian Zinc Advances

Montreal — The leading Canadian producer of zinc advanced prices 2 cents a pound as of Dec. 1 to the basis of: 17.25c for prime western; 18.00c for high grade, 99.75 per cent; 18.25c, high grade, 99.99 per cent. These prices are on the basis of delivery in Toronto and Montreal.

British Raise Zinc Prices

London — British Ministry of Supply has raised maximum zinc prices £14 per ton, effective as of Dec. 1. Good ordinary grades and prime western are now quoted £106; refined and electrolytic, £106 15s; electrolytic, 99.99 per cent grade, £108 5s. All prices are on the basis of "delivered buyers' works."

The announcement also set a price of £118, ex works, for zinc sheets of 10 gage and thicker, while boiler plates are quoted £116. The price of zinc oxide was raised £12 a ton.

The increases are due to recent increases in world market prices which affect the cost of imported metal.

NONFERROUS METAL PRICES

(Cents per pound, carlots, except as otherwise noted)

Copper: Electrolytic, 23.50c, Conn. Valley; Lake, 23.62½c, Conn. Valley.

Brass: Ingot: 85-5-5-5 (No. 115) 22.00c; 88-10-2 (No. 215) 31.00c; 80-10-10 (No. 305) 27.25c; No. 1 yellow (No. 405) 17.50-18.00c.

Zinc: Prime western 17.50c, brass special 17.75c, intermediate 18.00c, East St. Louis; high grade 18.50c, delivered.

Lead: Common 21.30-21.35c, chemical and corroding 21.40c, St. Louis.

Primary Aluminum: 99% plus, ingots 17.00c, pigs 16.00c. Base prices for 10,000 lb and over, fob shipping point, freight allowed.

Secondary Aluminum: Piston alloy (No. 122 type) 26.25-26.50c; No. 12 foundry alloy (No. 2 grade) 26.00-26.50c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 27.50-28.75c; grade 2, 26.50-27.25c; grade 3, 25.50-26.50c; grade 4, 25.00-25.50c. Prices include freight at carload rate up to 75 cents per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over, 20.50c, fob Freeport, Tex.

Tin: Grade A, 99.8% or higher (including Straits) $1.03; grade B, 99.8% or higher, not meeting specifications for grade A, with 0.05% max. arsenic, $1.028; grade C, 99.65-99.79%, incl., $1.024; 99.5-99.649% $1.024, grade F, 98-98.999% $1.015 for tin content. Prices are ex-dock, New York, in 5-ton lots.

Antimony: American 99-99.8% and over but not meeting specifications below, 38.50c; 99.8% and over (arsenic 0.05% max.; other impurities, 0.1% max.) 39.00c, fob Laredo, Tex., for bulk shipments.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 40.00c; 25-lb pigs, 42.50c; shot nom.; "XX" nickel shot, 43.50c; "F" nickel shot or ingots, for addition to cast iron, 40.50c. Prices include import duty.

Mercury: Open market, spot, New York $79-$81 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $24.50 per lb contained Be.

Cadmium: "Regular" straight or flat forms, $2, del.; special or patented shapes, $2.10.

Cobalt: 97-98%, $1.65 per lb for 550 lb (keg); $1.67 per lb for 100 lb (case); $1.72 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York, 70.00c per ounce.

Platinum: $93-$96 per ounce.

Palladium: $24 per troy ounce.

Iridium: $110-$115 per troy ounce.

Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill)

Sheet: Copper 37.18; yellow brass 34.59; commercial bronze, 95%, 37.23; 90%, 36.88; red brass, 85%, 36.01; 80%, 35.66; best quality, 35.33; nickel silver, 18%, 46.92; phosphor-bronze, grade A, 5%, 56.05.

Rods: Copper, hot rolled 33.28; cold drawn 34.28; yellow brass, free cutting, 38.16; commercial bronze, 95% 36.92; 90% 36.57; red brass, 85% 35.70; 80% 35.35.

Seamless Tubing: Copper 37.22; yellow brass 37.60; commercial bronze 90% 39.54; red brass 85% 38.92; 80% 38.57.

Wire: Yellow brass 34.88; commercial bronze, 95% 37.52; 90% 37.17; red brass, 85% 36.30; 80% 35.95; best quality brass 35.62.

Copper Wire: Bare, soft, fob eastern mills, c.l. 29.42½c, l.c.l. 29.92½-30.05c; weatherproof, fob eastern mills, c.l. 29.60-29.85c, l.c.l. 30.35c; magnet, delivered, c.l. 32.75-33.50c, 15,000 lb or more 33.00-33.75c, l.c.l. 33.50-34.25c.

ALUMINUM

Sheets and Circles: 2S and 3S mill finish c.l. (Two producers quote 1-cent per pound lower.)

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	26.9	...	...
0.135-0.096	12-48	27.4	...	...
0.095-0.077	12-48	27.9	26.0	29.6
0.076-0.068	12-48	28.5	26.2	29.8
0.067-0.061	12-48	28.5	26.2	29.8
0.060-0.048	12-48	28.7	26.4	30.1
0.047-0.038	12-48	29.1	26.6	30.4
0.037-0.030	12-48	29.5	27.0	30.9
0.029-0.024	12-48	29.9	27.3	31.3
0.023-0.019	12-36	30.5	27.7	31.8
0.018-0.017	12-36	31.1	28.3	32.6
0.016-0.015	12-36	31.8	28.9	33.5
0.014	12-24	32.7	29.7	34.6
0.013-0.012	12-24	33.6	30.4	35.5
0.011	12-24	34.6	31.3	36.7
0.010-0.0095	12-24	35.6	32.3	38.0
0.009-0.0085	12-20	36.8	33.4	39.5
0.008-0.0075	12-20	38.1	34.6	41.1
0.007	12-18	39.5	35.9	42.9
0.006	12-18	41.0	37.2	47.0

* Minimum length, 60 inches. † Maximum diameter, 24 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4, 17S-T4	——Hexagonal—— R317-T4	17S-T4
0.125	48.0	...	...
0.156-0.203	41.0	...	...
0.219-0.313	38.0	...	...
0.344	37.0	...	47.0
0.375	36.5	45.5	44.0
0.406	36.5	...	...
0.438	36.5	45.5	44.0
0.469	36.5	...	...
0.500	36.5	45.5	44.0
0.531	36.5	...	...
0.563	36.5	...	41.5
0.594	36.5	...	...
0.625	36.5	43.0	41.5
0.656	36.5	...	...
0.688	36.5	...	41.5
0.750-1.000	35.5	40.5	39.0
1.063	35.5	...	37.5
1.125-1.500	34.5	39.0	37.5
1.563	34.5	...	37.5
1.625	33.5	...	36.5
1.688-2.000	33.5	...	...
2.125-2.500	32.5	...	...
2.625-3.375	31.5	...	...

LEAD

(Prices to jobbers, fob Cleveland, Pittsburgh)

Sheets: Full rolls, 140 sq ft or more, $27.25 per cwt.; add 50c per cwt., 10 sq ft to 140 sq ft. Pipe: Full coils, $27.25 per cwt; cut coils, $27.50. Traps and Bends: List price plus 80%.

ZINC

Sheets, 22.00-22.50c, fob mill, 36,000 lb and over. Ribbon zinc in coils, 20.75-21.50c, fob mill, 36,000 lb and over. Plates, not over 12-in., 19.75-20.50c; over 12-in., 20.75-21.50c.

NICKEL

(Base prices, fob mill.)

Sheets, cold-rolled, 60.00c. Strip, cold-rolled 66.00c. Rods and shapes, 56.00c. Plates 58.00c. Seamless tubes, 89.00c.

MONEL

(Base prices, fob mill.)

Sheets, cold-rolled 47.00c; Strip, cold-rolled, 50.00c. Rods and shapes, 45.00c. Plates, 46.00c. Seamless tubes, 80.00c. Shot and blocks, 40.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.312 in. in diameter, less than 25 lb, 52.00-56.00c; 25 to 99 lb, 42.00-46.00c; 100 lb to 4000 lb., 35.00-36.00c.

DAILY PRICE RECORD

	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Nov. Avg.	23.50	21.325	16.580	103.00	17.00	38.50	40.00	73.655
Oct. Avg.	23.50	19.325	15.173	103.00	16.846	37.423	40.00	77.226
Nov. 1-6	23.50	21.30–21.35	15.50	103.00	17.00	38.50	40.00	74.75
Nov. 8-11	23.50	21.30–21.35	15.50	103.00	17.00	38.50	40.00	74.25
Nov. 12-15	23.50	21.30–21.35	15.50–17.50	103.00	17.00	38.50	40.00	74.25
Nov. 16-18	23.50	21.30–21.35	17.50	103.00	17.00	38.50	40.00	74.25
Nov. 19-23	23.50	21.30–21.35	17.50	103.00	17.00	38.50	40.00	73.75
Nov. 24	23.50	21.30–21.35	17.50	103.00	17.00	38.50	40.00	72.25
Nov. 26-27	23.50	21.30–21.35	17.50	103.00	17.00	38.50	40.00	71.25
Nov. 29-30	23.50	21.30–21.35	17.50	103.00	17.00	38.50	40.00	70.00

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis; Tin, Straits, del. New York; Aluminum, primary ingots, 99%, del.; Antimony, bulk, fob Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery, unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

Plating Materials

Chromic Acid: 99.9%, flake, fob Philadelphia, carloads, 26.00c; 5 tons and over 26.50c; 1 to 5 tons, 27.00c; less than 1 ton, 27.50c.

Copper Anodes: Base, 2000 to 5000 lb; fob shipping point, freight allowed: Flat untrimmed 33.84c; oval 33.34c; electrodeposited, 31.09c; cast, 30.12c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 46.00c, fob Niagara Falls, N. Y.

Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 16.00c; 1000 to 19,900 lb, 15.00c, fob Niagara Falls, N. Y.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 250 lb, 26.25c; over 250 lb, 25.25c, fob Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 56.00c; 10,000 to 30,000 lb, 57.00c; 3000 to 10,000 lb, 58.00c; 500 to 3000 lb, 59.00c; 100 to 500 lb, 61.00c; under 10 lb, 64.00c; fob Cleveland. Add 1 cent for rolled depolarized.

Nickel Chloride: 100-lb kegs, 26.50c; 275-lb, or 500-lb bbl, 24.50c, fob Cleveland, freight allowed on barrels, or 3 or more kegs.

Tin Anodes: Bar, 1000 lb and over 119.00c; 500 to 999 lb, 119.50c; 200 to 499 lb, 120.00c; less than 200 lb, 121.50c; ball, 1000 lb and over, 121.25c; 500 to 999 lb, 121.75c; 200 to 499 lb, 122.25c; less than 200 lb, 123.75c fob Sewaren, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers 71.8c; 100 or 300 lb drums only, 100 to 500 lb, 63.6c; 600 to 1900 lb, 61.2c; 2000 to 9900 lb, 59.4c. Prices fob Sewaren, N. J.

Zinc Cyanide: 100-lb drums 39.25c, fob Cleveland; 39.00c, Detroit; 38.00c, fob Philadelphia.

Stannous Sulphate: Less than 2000 lb, in 100 lb kegs, 100.00c, in 400 lb bbl. 99.00c; more than 2000 lb, in 100 lb kegs, 99.00c, in 400 lb bbl, 98.00c, f.o.b. Carteret, Wis.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 15,000 lb fob shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	21.125	21.125	20.375
Yellow brass	18.875	18.625	18.125
Commercial Bronze			
95%	20.250	20.000	19.500
90%	20.125	19.875	19.375
Red brass			
85%	20.000	19.750	19.250
80%	19.875	19.625	19.125
Best Quality (71-79%)	19.750	19.500	19.000
Muntz Metal	18.250	18.000	17.500
Nickel, silver, 10% ...	20.250	20.000	10.000
Phos. bronze, A.....	22.625	22.375	21.375
Naval brass	18.750	18.500	18.000
Manganese bronze ...	18.750	18.500	17.875

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, fob shipping point, carload lots)

No. 1 copper 20.75-21.00, No. 2 copper 19.75-20.00, light copper 18.75-19.00, composition red brass 17.25-17.50, auto radiators 14.50-14.75, heavy yellow brass 13.25-13.50, brass pipe, 14.50.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 21.75-22.00, No. 2 copper 20.75-21.00, light copper 19.75-20.00, refinery brass (60% copper), per dry copper content 19.25.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots or more)

Copper and Brass: Heavy copper and wire No. 1 19.00-19.50, No. 2 18.00-18.50, light copper 17.00-17.50, No. 1 composition red brass 15.25-15.50, No. 1 composition turnings 14.75-15.00, mixed brass turnings 8.75-9.00, new brass clippings 15.75-16.25, No. 1 brass rod turnings 12.75-13.25, light brass 8.75-9.25, heavy yellow brass 11.00-11.25, new brass rod ends 13.25-13.75, auto radiators, unsweated 12.75-13.00, cocks and faucets 12.25-12.50, brass pipe 12.75-13.25.

Lead: Heavy 19.50-20.00, battery plates 13.25-13.50, linotype and stereotype 19.50-20.00, electrotype 18.50-19.00, mixed babbitt 19.50-20.00, solder joints, 23.00-24.00.

Zinc: Old zinc 10.00-10.50, new die cast scrap 9.00-9.25, old die cast scrap 6.75-7.25.

Tin: No. 1 pewter 65.00-67.00, block tin pipe 83.00-84.00, No. 1 babbitt 51.00-54.00, siphon tops 50.00-52.00.

Aluminum: Clippings 2S 16.50-17.00, old sheets 13.00-13.50, crankcase 13.00-13.50, borings and turnings 6.50-7.00, pistons, free of struts, 13.00-13.50.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

PITTSBURGH

No. 1 Heavy Melt. Steel	$42.50-43.00*
No. 2 Heavy Melt. Steel	42.50-43.00*
No. 1 Busheling	42.50-43.00*
Nos. 1, 2 Bundles	42.50-43.00
No. 3 Bundles	40.50-41.00
Machine Shop Turnings	37.50-38.00
Mixed Borings, Turnings	37.50-38.00
Short Shovel Turnings.	38.00-40.00
Cast Iron Borings	39.50-40.00
Bar Crops and Plate	49.00-50.00
Low Phos. Steel	49.50-50.00
Heavy Turnings	39.50-40.00

Cast Iron Grades

No. 1 Cupola	65.00-66.00
Machinery Cast	72.00-73.00
Charging Box Cast	61.00-62.00
Heavy Breakable Cast.	60.00-61.00
Malleable	74.00-75.00
Brake Shoe	57.50-58.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	43.50-44.00
R.R. Malleable	75.00-80.00
Axles	55.25-56.25
Rails, Rerolling	59.00-60.00
Rails, Random Lengths	56.00-57.00
Rails, 3 ft and under.	60.00-61.00
Rails, 18 in. and under	61.50-62.00
Railroad Specialties	56.00-57.50
Uncut Tires	54.50-55.00
Angles, Splice Bars	53.00-54.00

* Plus applicable freight springboard.

CLEVELAND

No. 1 Heavy Melt. Steel	$42.00-42.50*
No. 2 Heavy Melt. Steel	42.00-42.50*
No. 1 Busheling	42.00-42.50*
Nos. 1 & 2 Bundles	42.00-42.50*
Machine Shop Turnings	37.00-37.50
Mixed Borings, Turnings	36.50-38.50
Short Shovel Turnings.	38.00-38.50
Cast Iron Borings	38.00-38.50
Bar Crops and Plate	47.00-47.50
Punchings & Plate Scrap	47.00-47.50
Heavy Turnings	42.00-43.00
Alloy Free Turnings	40.00-41.00
Cut Structurals	48.50-51.50

Cast Iron Grades

No. 1 Cupola	73.00-75.00
Charging Box Cast	60.00-62.00
Stove Plate	65.00-67.00
Heavy Breakable Cast.	57.00-62.00
Unstripped Motor Blocks	60.00-62.00
Malleable	78.00-80.00
Brake Shoes	55.00-57.00
Clean Auto Cast	73.00-75.00
No. 1 Wheels	64.00-66.00
Burnt Cast	59.00-61.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	43.00-44.00*
R.R. Malleable	79.00-81.00
Rails, Rerolling	62.00-68.00
Rails, Random Lengths	60.00-61.00
Rails, 3 ft and under.	63.00-66.00
Cast Steel	55.00-57.00
Railroad Specialties	58.00-60.00
Uncut Tires	58.00-59.00
Angles, Splice Bars	61.00-63.00

* Plus applicable freight springboard on earmarked material.

VALLEY

No. 1 Heavy Melt. Steel	$42.50-43.00*
No. 2 Heavy Melt. Steel	42.50-43.00
No. 1 Bundles	42.50-43.00
Machine Shop Turnings	37.00-39.00
Short Shovel Turnings.	39.00-39.50
Cast Iron Borings	38.50-39.00
Low Phos.	48.50-50.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	43.00-44.00*

* Plus applicable freight springboard.

MANSFIELD

Machine Shop Turnings	$37.50-38.00
Short Shovel Turnings.	39.50-40.00

CINCINNATI

No. 1 Heavy Melt. Steel	$42.00
No. 2 Heavy Melt. Steel	42.00
No. 1 Busheling	42.00
Nos. 1 & 2 Bundles	42.00
Machine Shop Turnings	36.00
Mixed Borings, Turnings	36.00
Short Shovel Turnings.	38.00
Cast Iron Borings	37.00

Cast Iron Grades

No. 1 Cupola Cast	63.00
Charging Box Cast	53.00
Heavy Breakable Cast.	59.00
Stove Plate	55.00
Unstripped Motor Blocks	56.00
Brake Shoes	50.00
Clean Auto Cast	63.00
Drop Broken Cast	71.00

Railroad Scrap

No. 1 R.R. Heavy Melt	43.00
R.R. Malleable	75.00
Rails, Rerolling	62.00
Rails, Random Lengths	58.00
Rails, 18 in. and under	63.00

DETROIT

(Brokers' buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$37.50-38.00
No. 1 Busheling	37.50-38.00
Nos. 1 & 2 Bundles	37.50-38.00
No. 3 Bundles	37.50-38.00
Machine Shop Turnings	31.50-32.00
Mixed Borings, Turnings	31.50-32.00
Short Shovel Turnings.	32.50-33.00
Cast Iron Borings	32.50-33.00
Punchings & Plate Scrap	42.50-43.00

Cast Iron Grades

No. 1 Cupola Cast	60.00-65.00
Heavy Breakable Cast.	54.00-59.00
Clean Auto Cast	60.00-65.00

BUFFALO

No. 1 Heavy Melt. Steel	$48.00-49.00
No. 2 Heavy Melt. Steel	41.75-42.25
No. 1 Busheling	41.75-42.25
No. 1 & 2 Bundles	41.75-42.25
Machine Shop Turnings	39.75-40.25
Mixed Borings, Turnings	39.75-40.25
Cast Iron Borings	39.75-40.25
Short Shovel Turnings.	40.75-41.75
Low Phos.	49.00-51.00

Cast Iron Grades

No. 1 Cupola	69.00-70.00
Mixed Cupola	66.00-68.00
Heavy Breakable Cast.	55.00-57.00
Malleable	70.00-75.00
Clean Auto Cast	70.00-72.00

Railroad Scrap

Rails, 3 ft. and under.	59.00-61.00
Railroad Specialties	58.00-60.00

PHILADELPHIA

No. 1 Heavy Melt. Steel	$45.00-45.50
No. 2 Heavy Melt. Steel	41.50
No. 1 Busheling	41.50
Nos. 1 & 2 Bundles	41.50
No. 3 Bundles	39.50
Machine Shop Turnings	37.50
Mixed Borings, Turnings	37.50
Short Shovel Turnings.	38.50-39.00
Bar Crop and Plate	49.00-51.00
Punchings & Plate Scrap	49.00-51.00
Cut Structurals	49.00-51.00
Elec. Furnace Bundles.	47.00-48.00
Heavy Turnings	45.50-46.50
No. 1 Chemical Borings	Nominal

Cast Iron Grades

No. 1 Cupola Cast	63.00-65.00
No. 1 Machinery Cast.	67.00-68.00
Charging Box Cast	64.00-65.00
Heavy Breakable Cast.	62.00-62.50
Unstripped Motor Blocks	59.50
Malleable	80.00-81.00
Clean Auto Cast	64.00-65.00
No. 1 Wheels	69.00-70.00

NEW YORK

(Brokers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$39.00
No. 2 Heavy Melt. Steel	37.00
No. 1 Busheling	37.00
Nos. 1 & 2 Bundles	37.00
No. 3 Bundles	35.00
Machine Shop Turnings	29.00-29.50
Mixed Borings, Turnings	29.00-29.50
Short Shovel Turnings.	30.00-31.50
Punchings & Plate Scrap	41.00-42.00
Cut Structurals	41.00-42.00
Elec. Furnace Bundles.	41.00-42.00

Cast Iron Grades

No. 1 Cupola Cast	57.00-58.00
Charging Box Cast	57.00-58.00
Heavy Breakable	58.00
Unstripped Motor Blocks	53.50-54.50
Malleable	68.00-69.00

BOSTON

(Fob shipping point)

No. 1 Heavy Melt. Steel	$38.90
No. 2 Heavy Melt. Steel	34.40
No. 1 Bundles	34.40
No. 1 Busheling	34.40
Machine Shop Turnings	29.90
Mixed Borings, Turnings	29.90
Short Shovel Turnings.	31.90
Bar Crops and Plate	40.00-41.00
Punchings & Plate Scrap	40.00-41.00
Chemical Borings	38.00-39.00

Cast Iron Grades

No. 1 Cupola Cast	60.00-65.00
Heavy Breakable Cast.	55.00-58.00
Stove Plate	54.00-55.00
Unstripped Motor Blocks	50.00-52.00
Clean Auto Cast	54.00-56.00

CHICAGO

No. 1 Heavy Melt. Steel	$41.50-42.00
No. 2 Heavy Melt. Steel	41.50-42.00
No. 1 Bundles	41.50-42.00
No. 2 Bundles	41.50-42.00
No. 3 Bundles	39.50-40.00
Machine Shop Turnings	36.50-37.00
Mixed Borings, Turnings	36.50-37.00
Short Shovel Turnings.	38.50-39.00
Cast Iron Borings	37.50-38.00
Bar Crops and Plate.	47.00-48.00
Punchings	48.00-49.00
Elec. Furnace Bundles.	44.50-45.00
Heavy Turnings	41.00-41.50
Cut Structurals	46.50-47.00

Cast Iron Grades

No. 1 Cupola Cast	70.00-71.00
Clean Auto Cast	70.00-71.00
No. 1 Wheels	60.00-62.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	45.00-46.00
Malleable	81.00-82.00
Rails, Rerolling	71.00-72.00
Rails, Random Lengths	59.00-60.00
Rails, 3 ft and under.	60.00-61.00
Rails, 18 in. and under	64.00-65.00
Railroad Specialties	55.50-56.50
Angles, Splice Bars	56.50-57.50

ST. LOUIS

No. 1 Heavy Melt. Steel	$44.00-45.00
No. 2 Heavy Melt. Steel	40.00-41.00
Machine Shop Turnings	35.00-36.00
Short Shovel Turnings.	36.50-37.50

Cast Iron Grades (Fob shipping point)

No. 1 Cupola Cast	65.00-66.00
Mixed Cast	56.00-58.00
Heavy Breakable Cast.	59.00-60.00
Brake Shoes	60.00-61.00
Clean Auto Cast	65.00-67.00
Burnt Cast	59.00-60.00

Railroad Scrap

R.R. Malleable	71.00-72.00
Rails, Rerolling	63.00-65.00
Rails, Random Lengths	56.00-59.00
Rails, 3 ft and under.	60.00-61.00
Uncut Tires	51.00-52.00
Angles, Splice Bars	54.00-56.00

BIRMINGHAM

No. 1 Heavy Melt. Steel	$39.50
No. 2 Heavy Melt. Steel	39.50
No. 1 Busheling	39.50
Nos. 1 & 2 Bundles	39.00
No. 3 Bundles	37.00
Long Turnings	24.50
Short Shovel Turnings.	26.00-27.00
Cast Iron Borings	25.00
Bar Crops and Plate	40.00
Cut Structurals	38.50

Cast Iron Grades

No. 1 Cupola Cast	63.00
Stove Plate	60.00-62.00
No. 1 Wheels	58.00-61.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	38.00
R.R. Malleable	nom.
Axles, Steel	50.00
Rails, Rerolling	58.00-55.00
Rails, Random Lengths	45.00-48.00
Rails, 3 ft and under.	53.00-55.00
Angles and Splice Bars	52.00-53.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	*$27.50
No. 2 Heavy Melt Steel	*27.50
No. 1 Busheling	*27.50
Nos. 1 & 2 Bundles	*27.50
No. 3 Bundles	*24.50
Machine Shop Turnings	*18.00
Bar Crops and Plate	*27.50
Cast Steel	*27.50
Alloy Free Turnings	*18.00
Cut Structurals	*27.50

Cast Iron Grades

No. 1 Cupola Cast	50.00-65.00

Railroad Scrap

No. 1 Heavy Melting	*28.50
Axles	*34.00
Rails, Random Lengths	*29.00

* Fob California shipping point.

SEATTLE

No. 1 Heavy Melt. Steel	$29.00-30.00
No. 2 Heavy Melt. Steel	29.00-30.00
No. 1 Busheling	29.00-30.00
Nos. 1 & 2 Bundles	29.00-30.00
No. 3 Bundles	24.50
Machine Shop Turnings	21.00-22.50
Mixed Borings, Turnings	21.00-22.50
Punchings & Plate Scrap	35.00
Cut Structurals	26.00-28.00

Cast Iron Grades

No. 1 Cupola Cast	50.00
Heavy Breakable Cast.	35.00
Stove Plate	30.00
Unstripped Motor Blocks	32.50
Malleable	40.00
Brake Shoes	35.00
Clean Auto Cast	40.00
No. 1 Wheels	37.50-40.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	28.50
Railroad Malleable	30.00
Rails, Random Lengths	30.00-32.00
Angles and Splice Bars	28.50

LOS ANGELES

No. 1 Heavy Melt. Steel	$27.50
No. 2 Heavy Melt. Steel	27.50
Nos. 1 & 2 Bundles	27.50
Machine Shop Turnings	20.00
Mixed Borings, Turnings	15.50-16.00
Punchings & Plate Scrap	28.00
Elec. Furnace Bundles	28.00

Cast Iron Grades

No. 1 Cupola Cast	50.00-55.00

HAMILTON, ONT.

(Ceiling prices, delivered)

Heavy Melt.	$23.00
No. 1 Bundles	23.00
Mechanical Bundles	21.00
Mixed Steel Scrap	19.00
Mixed Borings, Turnings	17.00
Rails, Remelting	23.00
Rails, Rerolling	26.00
Bushelings	17.50
Bushelings, new factory, prep'd	21.00
Bushelings, new factory, unprep'd	16.00
Short Steel Turnings	17.00

Cast Iron Grades*

No. 1 Cast	48.00-50.00
No. 2 Cast	44.00-45.00

* Removed from price control Aug. 9, 1947; quoted on basis of fob shipping point.

Sheets, Strip . . .

Strike-released cargoes will give West Coast users only temporary relief

Sheet Prices, Page 178

Los Angeles — Columbia Steel Co. has opened January and February bookings on sheet production at its Torrance and Pittsburg mills. Kaiser is making first quarter allocations at Fontana in all categories except pipe. Bethlehem and several other sources, however, have not yet opened their books for next quarter. With the maritime strike apparently at an end, users starving for sheet and strip anticipate only a little temporary relief from release of tonnages tied up in the harbor. Coating extras for all galvanized sheet products have been revised by Columbia, in line with recent boost in the price of zinc. Price increases posted by Columbia averaged approximately $2.50 a ton or about 2 per cent for all galvanized sheets and other flat-rolled zinc-coated products.

New York — Some sellers of hot and cold-rolled sheets have set up consumer quotas for the entire quarter, but at least two leading producers still have ventured no further than February. Some principal producers report quotas for non-certified consumers as about on the same scale as for the current quarter; however, in general this class of consumer will receive less. Sellers of electrical sheets are booked for the quarter and some producers of galvanized sheets also have set up schedules for the entire period. Stainless steel sheet deliveries can be had within 10 weeks in certain cases.

Pittsburgh — Sharp increase in zinc prices this year has focused attention on coating extras applicable to flat sheets. Throughout 1947 prime western zinc at East St. Louis was 10.50c per pound, while in 1939 the average price was 5.12c and in 1938, 4.61c. Importance of zinc as a production cost factor has been substantially increased as result of price advances this year to 17.50c. The coating extras table on galvanized sheets is based on estimated average cost within specific gage ranges for each fluctuation of one cent in zinc prices.

Extent of spread in coating extras now charged by a few of the producers is presented in the following table:

Coating Extras
Galvanized Flat Sheets
(dollars per 100 lb; based on 17.50-cent zinc)

	Gage			
	9-14	15-23	24-27	28-32
Armco	.34	.65	.98	1.35
Carnegie	.33	.65	.98	1.39
Bethlehem	.35	.65	.98	1.35
Republic	.33	.65	.98	1.39

A wider spread in coating extras applicable to formed roofing and siding is noted among various producers, ranging up to $4 a ton.

Cincinnati — While sheet mills are trying to devise first quarter schedules, pressure for tonnage continues strong. Demand reflects no letdown in needs for end products. The scope of voluntary allocations is certain to hold unrated tonnage close to recent quotas. Such allocations fall heaviest on galvanized, but specialties are likewise hit when production is shifted to meet most urgent requirements.

Cleveland—Production cutbacks already effected or scheduled by appliance, refrigerator and washing machine makers have not reduced demand on mills for steel. First to feel effect of any reduced demand will be warehouses, gray market operators and producers of conversion ingots. However, one producer of conversion ingots cannot meet demands fully for January delivery. Any reduction in demand at mill level as result of any cutbacks in household appliance output is expected to be offset at least for the near-term by shipments to industries assisted by voluntary allocations programs. Demand for stainless sheets is relatively easy but pressure for strip remains strong. Alloy steel products continue in heavy demand.

One steel producer which recently revised size and processing extras on hot-rolled carbon sheet and strip is considering possible revision of size extras on cold-rolled to restore the relationship that existed before the change on hot-rolled.

Study is continuing also on possible revision of policies on mill discounts on stainless steel sales to warehouses. Several months ago, some producers either abandoned or modified discounts on this product to warehouses. On the other hand some producers continued to give discounts.

Chicago—Next quarter may bring a new heyday to gray market steel sellers, if there is no significant

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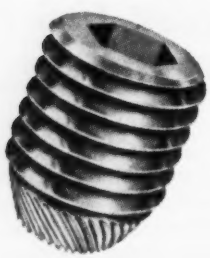

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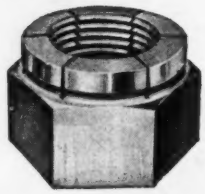

The patented KNURLED cup point of this popular "Unbrako" Socket Set Screw makes it a Self-Locker . . . because the keen edges of the counter-clock-wise KNURLS *positively prevent creep*, regardless of the most chattering vibration. A real fastener, if ever there was one . . . *positively will not shake loose!* Sizes from #4 to 1½" diameter, full range of lengths.

Because it is one-piece, all metal, full-threaded and resilient . . . and, because it is a rugged "Stop", "Lock", and "Plain" nut *all in one*—processed to have an exceptionally uniform and long-lasting torque—the "Flexloc" Self-Locking Nut is becoming widely accepted. Request samples.

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change in the overall demand situation by that time. There seems to be nothing producers can do to change this outlook. When quotas were announced by one important district producer about a month ago, reductions varying from 20 to 33 per cent were indicated for the coming period. These took into account the voluntary allocation programs as they then stood and were predicated on the hope that some of the preferred industries would pass from that category on Feb. 28, leaving more steel available for other customers. With extension of most of these programs beyond that date, the company finds itself overpromised on some steel products.

On the consumer side of the picture, reduced quotas from mills to them directly or to warehouses means that supplies must be augmented from some other source if production is to be kept high. The plight of one local manufacturer can be cited. Before the war he was supplied by a stamping concern and by warehouses, not because his steel needs were too small to warrant mill buying but because the sources provided services the mills did not offer. During the war, the company's product, a household appliance, was not manufactured so contacts were lost. After the war, the stamping firm was cut off from its mill supply by acquisition of that mill by a large consumer, and the manufacturer filled out his steel supplies from surplus government stocks either acquired by him directly or through brokers. With these depleted, he turned to gray market stuff, and until two months ago was meeting most of his requirements this way. Recently another stamper has been able to supply him with about 60 per cent of his needs, the rest coming from warehouses. However, he expects next quarter to have to return to the gray market for some of his steel.

Birmingham — Sheets have more than recovered whatever small ground they may have lost in demand recently due to inclement weather and its effect upon agriculture. Pressure is insistent from all quarters with supply gradually falling behind.

Tennessee Coal, Iron & Railroad Co. has announced a price increase of approximately $2.50 a ton on the company's zinc coated products. This is an increase of about two per cent above present prices and came as a result of the recent increase in the price of zinc.

St. Louis — Granite City Steel Co.'s $10 per ton price increase on cold-rolled sheets reflects the mill's efforts to keep each of its products on a self-supporting basis. Almost a year ago production of plates for the open market was stopped so as to concentrate output on sheets and tinplate. However, pig iron and scrap price rises, plus a four-month reduction in pig supplies and inability so far to operate a new cold reduction mill at capacity, compelled the boost in cold sheets, officials said. Sheet capacity is filled practically through the first quarter and second quarter bookings are not being accepted. Indications are output will be abreast of orders by second quarter's beginning, assuming no additional tonnage is taken under allocations program.

Starts New Galvanizing Line

Pittsburgh — Heavy galvanized sheets are now being produced on a new continuous coating galvanizing line at the Irvin Works of Carnegie-Illinois Steel Corp. at 300-ton daily rate. Similar line for light-gage material is scheduled to start operating at this plant in the next few months.

The new line is said to turn out a product of better quality than the old type hand sheet galvanizing method and, at the same time, eliminates need for further processes, such as box annealing, sheet pickling and hand feeding. Continuous method, it is claimed, produces more adherent coating which will not flake off or break in forming or bending of sheets. The zinc coating is also more uniform and thickness can be regulated more readily for special purposes under continuous coating operation.

The heavy gage line will coat steel strip 20 to 54 inches wide and 11 to 18 gage in thickness. Operating speeds are 8 to 120 feet per minute, with the average output being 300 tons in a 24-hour run. Coils of cold-reduced steel up to maximum of 50,000 pounds are fed into the line.

Steel Bars . . .

Bar Prices, Page 178

Pittsburgh — Most merchant bar producers have restricted December and January order acceptance with the hope of clearing up carryover tonnage by Feb. 1. In some instances, production outlook has been further clouded by the necessity of relining overworked blast furnaces, modernizing slab heating furnaces and other mill facilities. Some interests note a growing stability in alloy bar demand, in contrast with sporadic purchases of large tonnages reported earlier this year. However, new bookings for alloy bars continue to exceed production schedules. Somewhat larger tonnage for military uses has developed and is expected to expand further over coming months.

New York — Commercial bars will be the leading item in the newly proposed program for voluntary allocating 26,000 tons of steel for mining machinery construction and maintenance. Shapes and bars then follow in that order, with all three products to supply an estimated 75 per cent of requirements. The remaining 25 per cent of the total tonnage will be comprised principally of sheets and strip, with some pipe and tubing and perhaps a little semi-finished. This program should not impose any extra burden on the industry, as the tonnages involved are reported to represent the average monthly shipment of steel for these requirements during the first seven months of the year.

Philadelphia — Various consumers of carbon bars here report cuts in their first quarter allotments. This is not only at the hands of some Pittsburgh and midwestern suppliers, who have been diverting an increasing amount of tonnage to consumers nearer their own mills, but also of some eastern sellers who apparently have oversold and are entering the new year with substantial arrearages.

Chicago—Bar requirements of several forging shops have been scaled down and, while few order cancellations have been received, requests for delivery deferments have appeared. One explanation for this slackening is that automobile model changeovers have had a temporary effect on this business. Other customers, however, immediately take any released tonnage and could use considerably more than is available. As a general thing, spottiness in demand from a particular industry—notably automotive—has as its basis imbalance of inventories of other steel products, rather than any widespread easing.

St. Louis — Merchant bar supply has become critical. Mills are far behind delivery schedules and signs of improvement are dim because of rolling steel scarcities. Some orders which had been scheduled for third quarter shipment are still undelivered and now likely will have to await the first quarter. Some barmakers are booked as much as six months ahead. Steel to keep merchant bar rolling equipment at capacity operation has been unobtainable for several months. Concrete bars of rerolled rails, however, are in fairly easy supply.

Los Angeles — Supply and demand are moving closer together in this category. Larger and more diversified bar stocks are being received than at any time for months past. Bookings have been opened by Columbia's Torrance plant for January only.

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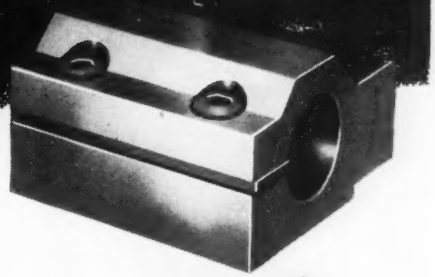

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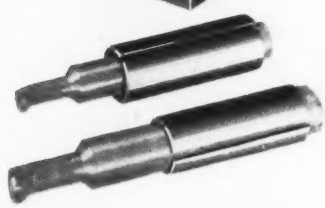

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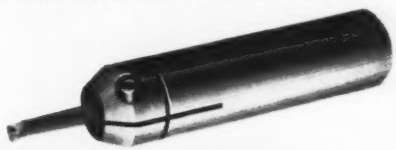

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Strike at Midvale Plant Ends

Philadelphia — Work is being resumed at the plant of the Midvale Co., Nicetown, after a suspension of six months due to strike. Following settlement involving concessions on both sides, maintenance men returned to the plant Nov. 26. Others are being called back as required. No official estimate as to how soon operations will be back to pre-strike levels is available.

Plates . . .

Plate Prices, Page 179

Philadelphia—Most district plate sellers will enter the first quarter with arrearages as heavy as, if not heavier than, those at the beginning of the current quarter. One has blanked out January completely and another has virtually done so. One mill has set up no new quotas yet for non-certified consumers for any part of the first quarter. On the other hand, another mill will enter the new quarter practically current, and has set up allotments for the entire period, subject to revision later should certified requirements take more than now anticipated. In only few instances, though, are sellers setting up allotments beyond February.

With the task committee meeting in Washington late last week to work out schedules on allotment programs approved recently by the Steel Industry Advisory Committee, plate mills may be called upon to roll more certified tonnage in February than they had anticipated.

New York — With voluntary allocations taking well over 30 per cent of scheduled production, producers are having difficulty in setting up quotas for non-certified customers. Up until late last week, one leading producer had not announced quotas for even the month of January, although it is generally assumed that most all of its production short of voluntarily allocated tonnage will go into arrearages.

Coast Guard, Washington, takes bids Dec. 27 on two single screw 128-foot steel hull lightships.

Birmingham — Plate users are feeling an intensified pinch for materials. Full force and effect of the Gadsden program which has resulted in diversion of considerable tonnage to steel pipe production for Southern Natural Gas is just now being felt. Some of the lighter gages are in somewhat better supply.

Los Angeles — Still greater stringency is in prospect for plate buyers. Although Geneva Steel Co. has opened its books for January, plate allocations will be substantially reduced. Reason is that Geneva is to begin strip production after the first of the year, sending hot-rolled coils to supply Columbia Steel Co.'s Pittsburg tin mill.

Seattle — Plate shops are restricting operations due to inability to obtain plates which are increasingly short. Mills have fallen behind in their deliveries, some plants here reporting no fourth quarter shipments as mills are trying to get back on schedule. First quarter allotments have not been announced.

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Structural Shapes . . .

Structural Shape Prices, Page 179

New York — Although new structural buying is rather spotty a substantial volume of work is actively pending, principally public work. One of the larger projects involves 3800 tons for an office building in Brooklyn for the New York City Board of Transportation, on which the Harris Structural Steel Co. is low bidder.

Philadelphia — While structural backlogs continue well extended, some fabricators are becoming more interested in new work. They look for a continued leveling off in contracts for a while, with a possible drop in some lines of heavy construction by mid-summer. Currently, demand in the local district is spotty, with new buying at a low level.

Newport News Shipbuilding & Dry Dock Co., Newport News, Va., is low on the construction of a 46,000-ton passenger liner for the Maritime Commission. Bid was $67,350,000. Bethlehem Steel Corp. was second with $75,649,000.

Baltimore — Twenty-six gates, each weighing 35 tons and sheathed in stainless steel, have been awarded the Metal Products Division of Koppers Co. Inc., this city, by the United States Army Engineers for the new Conemaugh river dam in western Pennsylvania. Delivery is to be made in 360 days. Cost will be $1,237,000.

Chicago — Fabricators' business for the most part consists of small jobs requiring less than 100 tons of steel. For a considerable period there has been a dearth of large-size construction although last week F. W. Woolworth Co.'s new Chicago warehouse, requiring 1460 tons of structurals, was awarded to Bethlehem Steel Co. Despite the relative lack of bigger jobs, steel demand shows no easing.

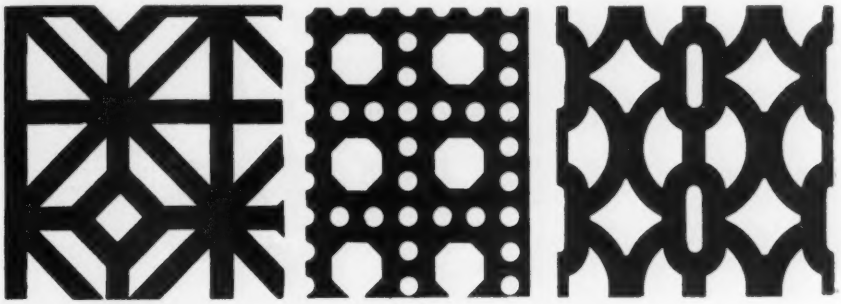
Los Angeles — Although supplies generally have not caught up with requirements, consumer pressure has relaxed. Principal factor is construction costs, with many projects being postponed or abandoned. In some instances, the output of other steel products is benefiting from diverted material. With the exception of one major structural producer, mills in the area have opened their first quarter bookings.

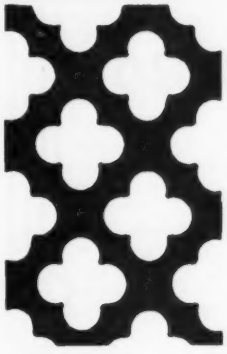
Seattle — While several important projects involving shapes are up for placement, local fabricators report a quiet week, no contracts of importance having been taken. Scarcity of materials is a deterring factor and plants are unable to bid on jobs involving larger tonnages. Prospect of release of strike-bound water shipments is encouraging, but mill allocations for the first quarter are disappointing. Wide flange shapes are critically short.

Wire . . .

Wire Prices, Page 179

Birmingham — Wire production is being maintained at virtual capacity, but supply lags behind demand. Wire fencing is reported still at a premium in most instances, while the demand for processing wire, especially for bed spring production, remains extremely active.





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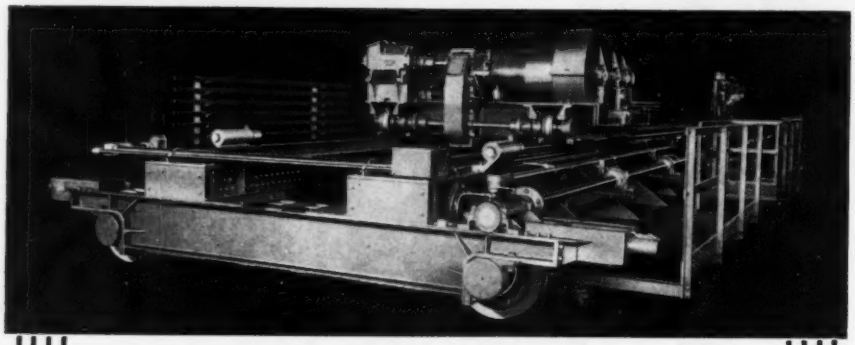

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Tubular Goods . . .

Tubular Goods Prices, Page 179

Beaver Falls, Pa. — Babcock & Wilcox Tube Co. has advanced seamless carbon boiler tubes, all sizes, 10 per cent, effective as of Nov. 22. The industry is considering an upward adjustment in alloy tubing prices to offset higher alloy tube round prices which are based on the alloy bar extra card.

Seattle — Seasonal apathy applies to the cast iron pipe market, no inquiries of importance being noted. Agencies are hoping for early release of a large tonnage held aboard intercoastal freighters.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 178

Seattle — Rolling mill production dropped slightly last week and further curtailment of operations for repairs is planned over the yearend. Meanwhile, mills are working on rather large backlogs for reinforcing bars. Pressure for accepting small jobs of less than 100 tons each continues unabated and some tonnage in small lots has been taken.

Warehouse . . .

Warehouse Prices, Page 181

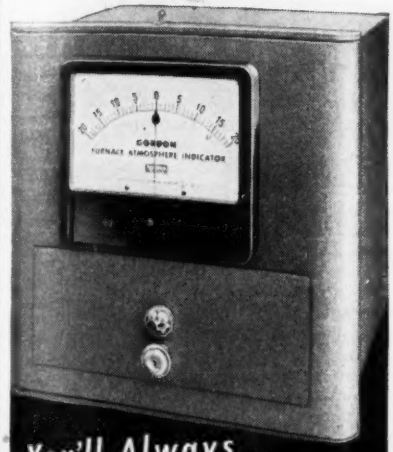
Chicago — Warehouses are often heard to complain about the way they are treated by mills. Since quota reductions are applied alike to all mill customers, this means greater pressure on warehouses, which they are unable to satisfy. A large number of warehouse customers are siding with them that mills should be more generous because of this pinch.

The confused situation in stainless steel prices at the warehouse level persists, since some distributors are still getting functional discounts from mills. Even these, however, are not heavily taxed with business for the product, it being the only one in which supply matches demand. Military and particularly aircraft needs are only infrequently filled from warehouse stocks so there has been no strengthening in demand from this direction.

Pittsburgh — Steel distributors have advanced galvanized sheet prices $2 a ton to the basis of $7.15 per 100 pounds for 10 gage, warehouse, to offset higher coating extras. City delivery prices continue at a differential of 15 cents per 100 pounds higher. Since mill suppliers here have not adjusted sheet and strip extras in line with the action initiated by Great Lakes Steel Corp. and Weirton Steel Co. and followed in part by Republic Steel Corp., there has not been any revision in warehouse quotations on these products.

Philadelphia—With yearend holiday influences likely to affect trading, leading jobbers doubt if business this month will much exceed, if any, the November volume, which in most instances was down from October (one leading distributor reported a decline of 12 per cent), although special circumstances tended to boost October volume higher than it would have been otherwise. However, buying is still active and still

Correct Furnace Atmosphere



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limited in major lines by unbalanced warehouse inventories.

Cincinnati — Demand for steel from warehouse is being sustained at near-record levels, presenting a serious distribution problem as mill customers come into the market for tonnage to supplement their mill quotas. Jobbers have advanced prices on galvanized.

Buffalo—Further tightness gripped trading warehouse products last week, as distributors were notified by mills that shipments would be cut below the present volume in the first quarter of 1949. With inventories in poor shape, distributors report prospects for filling commitments at listed prices are poor at this time.

Los Angeles — Jobbers are awaiting a flow of material released by termination of the shipping strike. Warehouse consignments idling in Los Angeles-San Pedro harbor are estimated at 40,000 tons, principally in the heavier hot-rolled categories most suitable for water shipment. Settlement will restore profit margins for jobbers to a more normal ratio for during the maritime tie-up they have been absorbing the increased cost of all-rail shipment averaging in many cases an additional $15 per ton. Sheet and plate, in particular, continue in extremely tight supply.

Seattle — Wholesale jobbers report a noticeable recession in demand this month, many small shops reducing operations because of decreased demand for their products. Whether this is due to the election or to seasonal factors is uncertain. Stocks continue low, but demand is insistent for the critical items, principally sheets, plates and bars. Alloys are fairly tight at source. The coast shipping strike has affected logging and maritime shops accounting in some degree for the reduced turnover of the jobbing trade.

Rails, Cars . . .

Track Material Prices, Page 179

New York — Bids on the large New York Central list, now involving a maximum of 7100 freight cars, have been postponed ten days until Dec. 13, so as to provide car builders with more time for making up estimates. Also there was one change in the number of cars specified; instead of inquiring for 100 to 200 mill type gondolas, the railroad is now in the market for 200 to 400 cars of this type.

The Reading, which several weeks ago was in the market for 1000 hopper cars only later to withdraw, is now inquiring for 500 fifty-ton hopper cars.

Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 179

Pittsburgh — Some easing in fastener demand is noted for fabricated structural work, but pressure for deliveries remains heavy with overall requirements showing no sign of receding. Most producers are unable to operate machines on a full five-day schedule because of continued inadequate steel supply, notably for cold-heading. Order backlogs remain extended 3 to 4 months within small-size classification of popular items, 1/2 to 5/8-inch long.

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MICRO GROUND

Pig Iron . . .

Demand for gray iron castings declines in Buffalo area, causing one foundry to close

Pig Iron Prices, Page 180

Buffalo — Easier conditions in the gray iron foundry trade were emphasized during the week with the announcement that General Motors would close its General Foundry Division plant at Lockport, N Y., within the next 60 to 90 days. Employes with seniority will be given an opportunity to shift to one of the division's plants in Defiance, O., Danville, Ill., or Saginaw, Mich. The announcement said that a "reduction in the demand for gray iron castings in this area caused this action. This backlog of orders for household appliances accumulated during the war now has been filled and manufacture of these products will continue on a basis to meet current needs . . . Most of the remaining orders now in the Lockport plant for other areas will be transferred to other Central Foundry plants."

One merchant iron producer also disclosed that efforts will be made to allocate increased quantities of iron to consumers who need additional supplies to lift production. At least two of the top melters in the area have pulled in all outside orders from smaller jobbing plants. They are now in a position to fill their own needs in castings.

New York — While buying of foreign iron has declined from a few weeks ago, the recent ending in the East of the longshoremen's strike after 18 days has freed substantial tionnage of iron under contract. Not only are several cargoes of iron now being unloaded, but sailings on the other side have been resumed. As a result, pressure for iron continues to ease, although supply does not equal requirements. Some foundry consumers report a falling off in order backlogs and, in a few instances, are holding up shipment of iron. It is doubtful if district jobbing foundries actually have an average of much more than 30 days' supply of orders on hand. Some of the recession is due not only to a winding up of contracts for castings, but to a suspension by consumers of castings, especially in the so-called specialty and luxury lines, until they can work off finished products on hand.

Philadelphia — Although overall demand for foundry iron is still in excess of supply, some consumers are pressing less actively. Their backlogs have shrunk and in certain cases they are operating at no more than four days a week. They report also that their customers are inspecting the quality of castings much more closely. Some of the larger castings consumers, with their own foundries, are no longer farming out work to other foundries; and this has hit jobbing shops.

The rehabilitated Chester, Pa., furnace, which is expected to be blown in around the middle of the month, will supply 5000 tons of basic to a district mill, with deliveries likely to run over the first quarter. To compensate for the loss of this tonnage, a Pittsburgh district mill, which is scheduled to supply owners of the furnace with tube rounds, will re-

ceive an equal supply of iron from a Mahoning Valley furnace. Some additional tonnages of basic from this furnace may eventually move into the merchant trade.

A district merchant furnace, after meeting increased demands for basic from its affiliated steel mill, started last week on a run of foundry to get caught up on what was still due for November and to meet December quotas. This interest also has been able to increase its oven coke shipments by about 20 per cent and will be able to do still better late in January, when its repair program is scheduled for completion.

Pittsburgh — Supply of merchant iron is expected to remain critically short at least through the first half of 1949, despite a "softening" in demand for castings reported by some jobbing foundries. Ratio of cast scrap to pig iron use in melting operations remains much higher than normal. In addition to the 3 million ton pig iron expansion program under way among integrated steel producers, considerable emphasis is placed on the effort to improve the quality of coal through installation of coal-washing facilities which would reduce the ash and sulphur content. Advocates of this practice claim it greatly reduces the loss of 5 to 10 per cent in blast furnace yield.

No. 2 blast furnace at the Monessen Works of Pittsburgh Steel Co. was blown in after being idle since last spring. Sufficient rolling stock is available to service it, the company said. Capacity of this furnace is about 20,000 tons monthly. It had been taken out of production when the company started operations at the big No. 3 furnace which was purchased from the War Assets Administration.

Cleveland—A buyers' market for castings has arrived, a leading foundry here reports. Demand for castings is definitely down and business is being sought not only by local jobbing foundries but also by some which have sent representatives 200 to 300 miles to Cleveland. Castings prices are being shaded downward in some instances. Because of the reduced demand for castings, some foundries in this area have cut labor forces and others have reduced workweeks to three or four days.

This situation has eased the tight supply-demand picture on pig iron, although domestic producers of iron have no difficulty disposing of all they can make. Foundries are attempting to return to a normal proportion of iron in melts and reduce consumption of high-priced scrap. Also helping continue demand for iron is an effort of foundries to build an inventory of iron again.

There are some expectations the lull in jobbing foundry business here is only temporary in view of anticipated military preparedness activities.

Foreign iron ordered some time ago is again arriving, now that the East Coast shipping strike is over. However, there is little new ordering of foreign iron.

A Birmingham merchant iron blast furnace of Republic Steel Corp. has come back into operation after being down 25 days for relining.

Chicago — No let-up is in sight from the unrelenting pressure of

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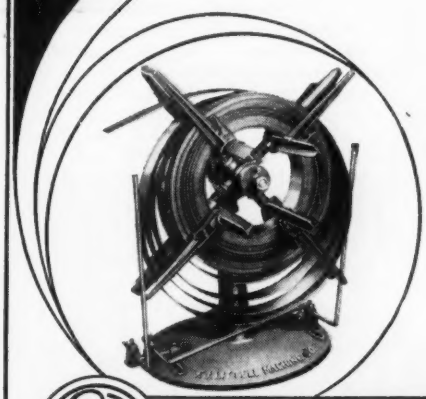

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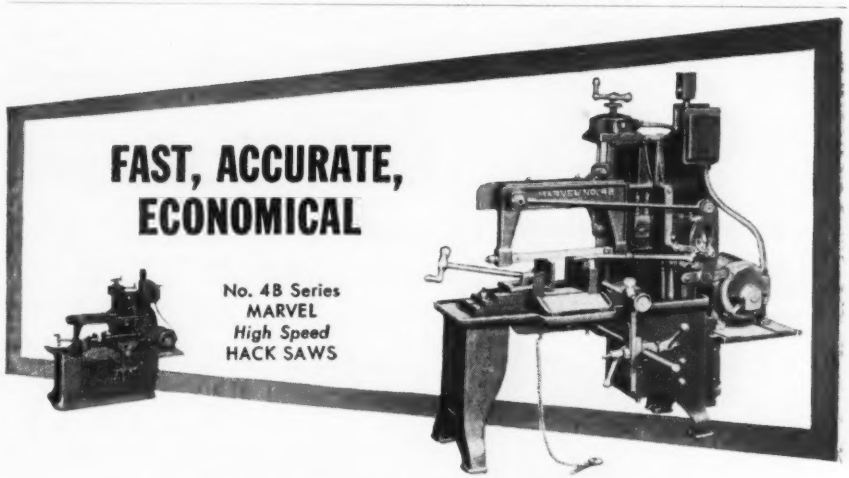

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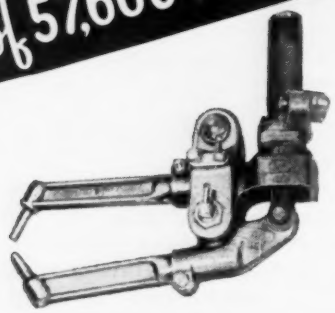

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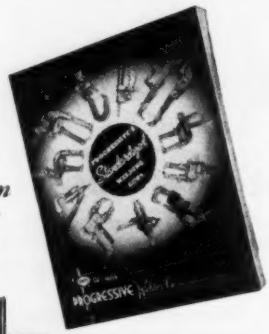

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foundries for more iron and coke. Melt would be improved if these demands could be met and the ratio of iron increased, but among all suppliers the situation is uniform: "Not enough to go around."

Gary Works of Carnegie-Illinois Steel Corp. about ten days ago relighted one furnace which had been down for relining and shortly thereafter blew out another for the same purpose, leaving ten in operation.

Cincinnati — Shipments of northern iron are increasing, but those of southern iron still lag behind schedule. Tonnage moving into this district is far short of needs, although demand for castings is shrinking. Most melters are using far more scrap than they would if pig iron supplies were easier.

Birmingham — Pig iron users have been unable to make any appreciable progress in their objective toward increased production with the advent of additional iron from the government stack at Gadsden and return to normal production by merchant stacks here.

St. Louis — Pig iron supplies are increasing as Missouri Illinois furnaces' production improves. Mo-Ill's daily pourings now are expected to range between 1000 and 1100 tons indefinitely, placing iron consumers in this district in the best shape for pig in many months. Mo-Ill's furnace coke production is at the normal 850 tons daily and ore piles are now sufficient to carry through to the spring opening of water transportation.

Scrap . . .

Scrap Prices, Page 184

Philadelphia—Recent ending of the Longshoremen's strike has permitted the resumption of a substantial flow of imported scrap. Three cargoes for three different importers are now being unloaded here, and there is resumed activity at New York and Baltimore. The leading eastern consumer is now unloading two cargoes at Baltimore and one each at New York and Philadelphia and has 17 shipments enroute to this country, of which three or four are coming in from Europe and the remainder from the Pacific area.

While mill inventories of scrap are substantially improved as compared with a year ago and the prospects for imported scrap are so much better, open-hearth steel prices are still unchanged, although steel mill cast scrap is easier in tone.

The bottom has dropped out of No. 1 chemical borings market, with prices purely nominal. The two leading consumers are no longer taking in shipments and one is reported to be so overstocked that it is offering tonnage for resale.

New York — Strength characterizes the scrap market here, with offerings unchanged on all major items. Despite improved inventories at consuming plants, demand for steel scrap is being well sustained.

Pittsburgh — Both large and small mills claim to be in fairly good shape in respect to scrap inventories. On a national basis, purchased scrap stocks are estimated to approximate 1-1/2 months supply and are said to exceed inventories at time of Pearl Harbor by over one million tons, also

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the prewar peak level obtained since data was first compiled late in 1939. Consumers are estimated to have increased scrap inventories by one million tons this year. More favorable stock position has made it possible for mills to be more selective as to quality and in reaching out for remote material. A severe winter would adversely affect currently improved scrap supply position. One leading producer recently obtained a reduction of about $3 per ton in rail freight charges on scrap shipments from Florida. Demand for cast iron scrap items remains strong, reflecting inadequate pig iron supply. Price fluctuations have been relatively minor in recent weeks, and are not expected to record significant change until after year end at earliest.

Cleveland—Declines here of $1 to $2 in some grades of cast scrap reflect reduced requirements of foundries owing to an easing in demand for castings.

Demand last week in the Cleveland district for open-hearth and electric furnace grades of scrap continued steady to strong, while for blast furnace grades it was steady, although showing tendencies toward weakening.

Buffalo—Despite a good movement of scrap, brought about by the prolonged period of open weather, a steady to strong tone prevails in the scrap market. Turnings and borings jumped an additional 25 to 50 cents a ton. Dealers were reported operating on the usual 50-cent brokerage fee in transactions involving substantial tonnages of turnings and borings; the buying basis being $39.75 with the consumer paying $40.25. Short shovelings were bringing a dollar more.

Listed quotations on steelmaking items were unchanged, but dealers continue to report a higher market on conversion and so-called "tricky" sales. Little or no tonnage is moving strictly on formula prices. While the listed quotation on No. 2 heavy melting is still $42.25 a ton, the general opinion is that the market is about $2 higher when consideration is given to conversion trades. In addition, sales of No. 1 heavy melting are reported as high as $50 a ton.

Detroit — Current inventories in the hands of melters are comfortable and it is believed they will not be reinforced in the near future because of a developing trend throughout industry to trim inventories. Scrap prices in ingot conversions have dropped by about $2 a ton in the past month, and there are even reports heard of ingots "going begging," one recent offer of 1000 tons per month for 11 months finding no takers. Weakness continues on turnings, principally because of inability to move off-grade stocks.

Chicago — Quality of scrap currently means more to steel mills than quantity and this selectiveness substantiates many brokers' belief that mill stocks have risen as high as good judgment recommends. The buying reluctance is especially pronounced in bundles. Because of the current stand-offishness of mills toward dealer scrap, the tone is easier, although there is no sign that formula price levels will be ruptured. Earmarked and railroad scrap continue to move steadily, and in the latter type rerolling rails are $1 higher at $71 to

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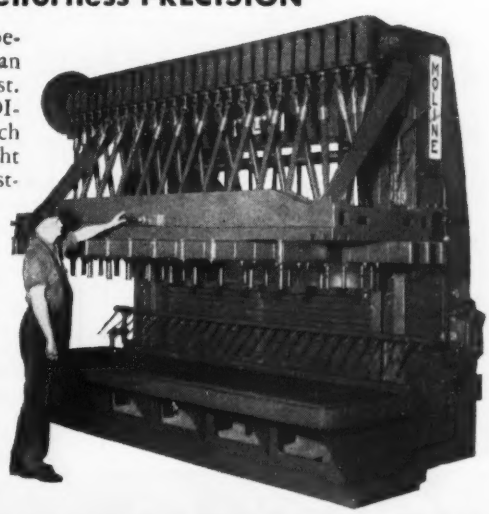

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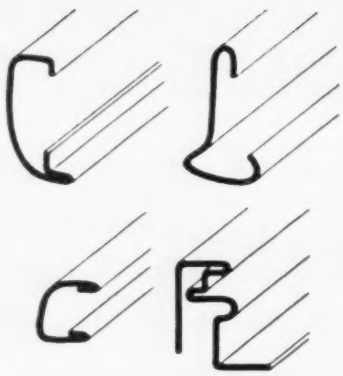

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$72. Cast scrap demand has shown a slight increase recently. While there are scattered instances reported of companies paying above prevailing levels, tonnage moved in these deals is negligible.

Cincinnati — Scrap market is firm despite comfortable inventories. Collections have sagged and the tonnage coming out is moving steadily at formula. The market for foundry scrap is relatively dull, but so far there is no glut to induce lowered prices. Railroad specialties continue weak.

St. Louis — Mill and foundry scrap reserves range from 45 to 60 days. Assuming normal shipments during the winter season, most have enough on hand to carry through till the spring pickup. Scrap from the rural areas is coming out a bit better and some relief is being felt here from imports. Mills themselves are reaching out for supplies direct, whenever possible. Laclede Steel, for example, is taking a shipload of scrap from Cuba destined to move next month on an experimental river-ocean barge line operating via Havana, New Orleans and St. Louis. Price was not disclosed, but it was reported to be in line with the current market. The success of this shallow-draft boat line may have considerable bearing on future St. Louis scrap supplies. Mills still complain of scrap quality, and it is felt imports from untouched Caribbean sources may improve both the tonnage and quality.

Quality, in fact, has been one reason for the uncertainty of the market here on railroad scrap. Offerers of this quality metal are attempting to establish, by sales to conversion users of rails, as high a price as possible for the general scrap rail market. Rerollers and melters whose product can by-pass the open hearth furnace and absorb high costs are reported paying up to $71. But mills for that reason are almost entirely out of the scrap rail market. Buyers are balking at anything over $64. Railroads here consider the sealed bid prices at which they sell as confidential matters, with the result the trade is kept in the dark on going prices, a fact which aids competition on high quotations to conversion rail users. Last sales here to users of rails as melting scrap were reported at $59, and Missouri Pacific Railroad's last sale was at $53 net.

Los Angeles — Demand continues strong, with prices steady. Release of large cargoes of pig iron and scrap from strike-bound vessels will be of considerable benefit supply-wise. There is some conjecture about a possible effect on prices, temporarily at least. Considerable tonnages of scrap from Guam and the Philippines are reported to be in the harbor, consigned to local dealers.

Seattle — The steel scrap market is unchanged, mills hoping they will be able to continue through the winter without being forced to close by lack of scrap. Presently the supply about equals consumption but there is little margin from day to day. The price level is firm at $30 per gross ton, with individual deals probably being made above this figure. Some potential sellers are holding back anticipating a further rise. Few surplus ships are available for breaking. Shipments from Alaska will await milder weather.

Plans To Step Up Scrap Drive

Washington — Members of the Scrap Drive Committee will meet in Washington on Dec. 8 to step up the nationwide industrial iron and steel scrap drive through the winter months. The Committee was appointed by Secretary of Commerce Charles Sawyer in November following an earlier meeting at which more than 200 trade association executives pledged their support to the proposed scrap drive.

The winter scrap drive, concentrating on industrial establishments, auto wrecking yards, and farms, is designed to bring out high grade heavy scrap urgently needed to keep the mills and foundries operating at capacity in the months ahead.

The committee, composed of more than 70 trade association executives, will work directly with Alex Miller, OIC chief scrap consultant and chairman of the Interdepartmental Ferrous Scrap Committee.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 180

Cincinnati — A new high record in consumption of bituminous coal by the oven foundry coke industry may be in the making according to spokesmen for Appalachian Coals Inc., this city. The record is 95 million tons, in 1944. Coke demands may take 107 million tons in 1948. Tonnage in 1947 was near the amount used in 1944.

Canada . . .

Toronto, Ont.—Production of primary iron and steel shapes in Canada during August amounted to 272,202 net tons, against 276,250 tons in July and 244,601 tons in August, 1947. For August, output included 262,790 tons of carbon steel shapes and 9412 tons of alloy steel shapes. In the figures for August are included 70,955 tons of shapes shipped to producers' own plants, or plants within the primary industry for further processing.

In August, shipments of shapes for sale totaled 195,105 net tons, of which 185,188 tons were carbon steel shapes and 9917 tons alloy steel shapes; for July, shipments amounted to 206,243 net tons including 197,066 tons of carbon and 9177 tons of alloy steel shapes; for August, 1947, shipments totaled 182,324 tons of which 172,301 tons were carbon and 10,023 tons alloy steel shapes. The figures showing shipments for sale do not include deliveries to primary producers for further processing.

Shipments of primary iron and steel shapes for August included 533 tons of semifinished shapes; 11,067 tons of structurals; 18,087 tons of plates; 24,701 tons of rails; 3458 tons of tie plates and track materials; 43,510 tons of hot-rolled bars; 9973 tons of pipe and tubes; 24,395 tons of wire rods; 18,257 tons of black sheets; 7218 tons of galvanized sheets; 8778 tons of castings; 4529 tons of miscellaneous hot-rolled products and 15,796 tons of all other products.

Of the tonnage shipped for sale in

August, 32,352 tons went directly to railways and railway car shops; 8985 tons to pressing, forming and stamping plants; 33,743 tons to merchant trade products; 20,776 tons to building construction; 15,623 tons to the containers industry; 7450 tons to agricultural equipment; 10,596 tons to the automotive industry; 10,832 tons to machinery plants; 4066 tons to shipbuilding; 6908 tons to mining, lumbering, etc., and 2362 tons to miscellaneous industries. Wholesalers and warehousing accounted for 20,661 tons and exports for 20,751 tons.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

1460 tons, F. W. Woolworth Co. warehouse, Archer and Lawndale Aves., Chicago, through Turner Construction Co. to Bethlehem Steel Co.

550 tons, power plant, Michigan City, Ind., for Northern Indiana Public Service Co., to Duffin Iron Co., Chicago.

300 tons, plant building at Sandusky, O., for Philco Corp., Philadelphia, to Bethlehem Steel Co.

175 tons, Temple Israel, Great Neck, Long Island, to Grand Iron Works, New York.

129 tons, Sherwood elementary school, Chicago, to Duffin Iron Co., Chicago.

STRUCTURAL STEEL PENDING

3800 tons, 14-story office building, New York City Board of Transportation, Brooklyn, N. Y. Harris Structural Steel Co., New York, low bidder.

2350 tons, exit viaduct, Holland Tunnel, Jersey City, N. J.; pending.

2200 tons, Mississippi river bridge, Hastings, Minn.; bids to Minnesota State Highway Department about Dec. 17.

1100 tons, state bridge, Wildwood, N. J.; Kolyn Construction Co., Trenton, N. J., low on general contract.

650 tons, also 300 tons steel piling and 350 tons steel decking, Washington state Manette bridge; McRae Bros., Seattle, low $661,060.

485 tons, bridge, routes 28-29 connection, Bridgewater township, Somerset county, New Jersey; bids Dec. 16, state highway commissioner, Trenton.

400 tons, hospital, Lewistown, Pa.; bids asked.

260 tons, private hospital, East Stroudsburg, Pa.; pending.

250 tons, Washington state bridge Kittitas county; general contract to M. P. Butler, Seattle, low $224,390.

200 tons, power house addition, Eastern Shore Public Services, Vienna, Md.; bids asked.

175 tons, also 25 tons reinforcing, Shasta dam railroad relocation; bids to Bureau of Reclamation, Redding, Cal., Dec. 29.

Unstated tonnage, Mt. Alvernia Seminary, Wappinger Falls, N. Y.; bids asked.

Unstated, state highway bridge Northport, Wash.; General Construction Co., Seattle, low $591,070.

Unstated, Montana state Big Blackfoot river 354-foot bridge; bids to Helena, Dec. 17.

Unstated, galvanized steel transmission towers and steel anchorages for North Bonneville-Troutdale line; bids to Bonneville Power Administration, Portland, Dec. 3.

REINFORCING BARS . . .

REINFORCING BARS PLACED

270 tons, state acute hospital, Kankakee, Ill., through W. E. O'Neil Construction Co. to Olney J. Dean Steel Co., Chicago.

REINFORCING BARS PENDING

12,500 tons, estimated, Soap Lake siphon, Columbia Basin project; bids about Dec.

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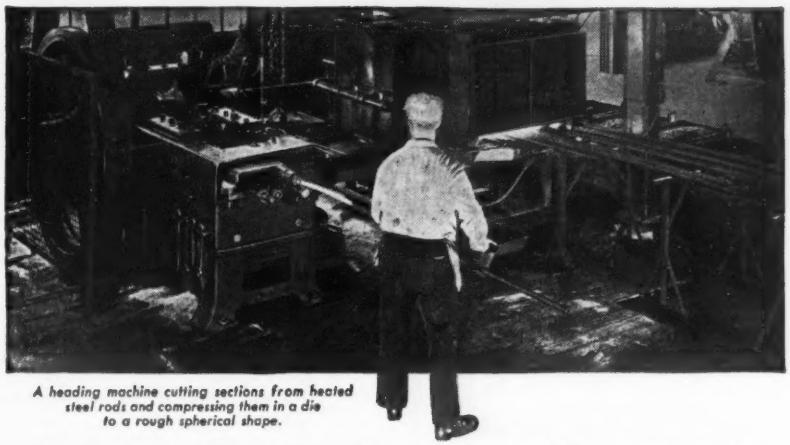

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15, to Utah Construction Co. and Winston Bros. Construction Co., joint low bidders $7,614,729, and recommended for award.

3500 tons, Garrison dam project, North Dakota; bids in to U. S. Engineers.

2100 tons, Ft. Randall dam, outlet work, South Dakota; bids to U. S. Engineers, Omaha, Dec. 17.

750 tons, cont. 8, Chicago Sanitary District; bids over estimate, to be rebid later.

590 tons, Cook county bridge, section 263-0202-1-3; Thomas McQueen Co., Chicago, low on general contract.

395 tons, highway reinforcing, 110,000 square yards, 10-inch, Bridgewater township, Somerset county, New Jersey; bids Dec. 16, state highway commissioner, Trenton.

355 tons, bridge, routes 28-29 connection, Bridgewater township, Somerset county, New Jersey; bids Dec. 16, state highway commissioner, Trenton.

325 tons, auxiliary outlet sewers, central south side system, Princeton Ave., cont. No. 1-A, for Department of Public Works, Chicago; Michael Pontarelli Inc., Chicago, low on general contract.

280 tons, Washington state highway projects; general contracts awarded.

244 tons, warehouse, Marathon Corp., Wausau, Wis.; Permanent Construction Co., Chicago, contractor.

229 tons, eastern yards, Navy, Bureau of Supplies and Accounts; bids Dec. 6, inv. 7401.

123 tons, substructure for Clearwater state bridge, Lewiston, Idaho; J. H. Wise & Sons, Boise, low $241,757; bids for main structure soon.

121 tons, Caldwell Ave. bridge, Cook county; Thomas McQueen Co., Chicago, low on general contract.

Unstated, stadium, Cedar Rapids, Iowa; bids taken Dec. 6.

Unstated, Washington state Columbia river bridge at Northport; General Construction Co., Seattle, low.

Unstated, pumping plant for Multnomah County Drainage district No. 1, Portland, Oreg.; general contract to Guy F. Atkinson Co., Portland.

Unstated, Army barracks in Alaska and other military installations; bids about Dec. 15.

PIPE . . .

CAST IRON PIPE PLACED

780 tons, 4 and 6 inch for Spokane, Wash., to Pacific States Cast Iron Pipe Co., Provo, Utah.

CAST IRON PIPE PENDING

350 tons, 23,200 feet 6 and 8 inch Class 150 and fittings; bids to Charles Bridges, city clerk, Kent, Wash., also alternatives.

STEEL PIPE PENDING

Unstated, 12,800 feet for Veterans center, Medford, Oreg.; bids to Veterans Administration, Seattle, Dec. 14.

Unstated, 500,000-gal steel tank, also about 20,000 feet 6 to 12 inch water pipe, for College Place, Wash.; plans in preparation by John W. Cunningham and Associates, Portland, Oreg.

RAILS, CARS . . .

RAILROAD CARS PLACED

Cambria & Indiana, 200 gondolas, to Bethlehem Steel Co.

Minneapolis, St. Paul & Sault Ste. Marie, 35 seventy-ton hopper cars, to General American Transportation Corp., Chicago, and 2 baggage cars to the American Car & Foundry Co., New York.

RAILROAD CARS PENDING

Reading Co., 500 fifty-ton hopper cars, bids asked.

LOCOMOTIVES PLACED

Kentucky & Indiana Terminal, five 1000-horsepower Diesel-electric switch engines, to Fairbanks, Morse & Co., Chicago.

CONSTRUCTION AND ENTERPRISE

CALIFORNIA

LOS ANGELES—Union Hardware & Metal Co., Edward H. McLaughlin, president, East First St., is planning to build a $3,250,000 plant which will include three warehouses and an office building on Ferguson Drive; A. C. Martin & Associates, architects.

LOS ANGELES—Republic Supply Co. of California, wholesaler and manufacturer of industrial, oil well and marine supplies, is planning to build a $1,250,000 plant which will include office space, warehouse space and pipe storage space at 2600 Eastland Ave.; G. V. Russell and E. J. Samaniego, architects; Griffith Co., constructors.

SOUTH GATE, CALIF.—Pittsburgh Erie Saw Corp. has awarded a $140,000 contract to Davies, Keusder & Brown, 4915 Exposition Blvd., Los Angeles, for construction of a factory building at 5767 Imperial Highway; Ellis Wing Taylor, 803 W. Third St., Los Angeles, architect-engineer.

IDAHO

BOISE, IDAHO—Bradley Mining Co. has begun construction on a $1 million antimony smelter at Stibnite, Idaho.

BRUNEAU, IDAHO — F. H. Merrill, 2420 Ocean View Ave., Los Angeles, is planning to build a dairy plant and diversion dam in Snake River for electric generator for water pump to cost $8 million.

ILLINOIS

CHICAGO—U. S. Rubber Co., 440 W. Washington St., has awarded a $1 million contract to Poirot Construction Co., 2001 W. Pershing Rd., for construction of a warehouse and offices.

LINCOLN, ILL.—Abraham Lincoln Memorial Hospital is planning to construct a $1,250,000 hospital; plans by Deal & Deal.

MASSACHUSETTS

CAMBRIDGE, MASS.—Harvard University, J. B. Conant, president, plans to construct seven dormitories costing $3 million in the Harvard Square section, Jarvis Field.

MISSOURI

KANSAS CITY, MO.—University of Kansas City, Dr. C. R. Decker, president, plans to build a $250,000 library building and a $350,000 law school; plans by Hardy & Schumacher, Scaritt Arcade Bldg.; W. Scholer & Assoc., Lafayette, Ind., associate architects.

NORTH DAKOTA

FARGO, N. D.—Linde Air Products Co. has awarded a $200,000 contract to Meinecke-Johnson Co., 5 N. Fourteenth St., for construction of a plant.

OHIO

BARBERTON, O.—Pittsburgh Plate Glass Co., Columbia Chemical Division, has awarded a $500,000 contract to Heller-Murray Co., Youngstown, for construction of a bridge, a laboratory and installation of a coal handling system at its chemical plant which is part of a $1 million expansion program.

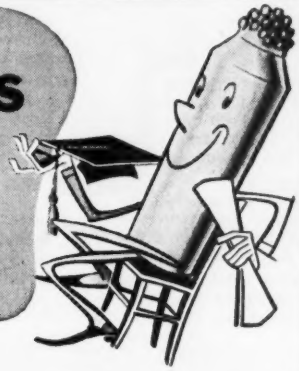
CLEVELAND—Crucible Steel Castings Co., 8401 Almira Ave., will spend $35,000 on construction of a factory and office addition.

CLEVELAND—Schutt Pattern Works, 3814 St. Clair Ave., Harry A. Schutt, has taken a lease on a building at 1390 E. 170 St., beginning Jan. 1.

CLEVELAND — Crowley-Thompson Chemical Co., Lederer Terminal Warehouse, has been formed by F. J. Crowley and P. L. Thompson to take over the Ferro Chemical Corp.'s division for the resale of heavy chemicals.

CLEVELAND—Eaton Mfg. Co., J. O. Eaton, chairman, 739 E. 140th St., has purchased a Saginaw, Michigan, plant it has been

DRESSERS WITH A DEGREE!



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operating under lease from the WAA for $750,000. Products manufactured here include mechanical and hydraulic valve lifters, valve seat inserts for the automotive and aviation industries, and dynamatic engine-cooling fans for the automotive trade.

COLUMBIANA, O.—Columbiana Machine Co., 350 S. Main St., has been incorporated by E. W. Evans, Raymond M. Snoke, O. C. Weber, Joseph Magill, Raymond S. Exten and Arden M. Lehman to make rubber working machinery, equipment for steel mills, fire brick pressing dies and to do job machine work.

CUYAHOGA HEIGHTS, O.—Freeway Washer & Stamping Co., 4911 Grant Ave., has awarded a $100,000 contract to O. E. Jansen, 2073 Bunts Rd., Lakewood, for erection of a factory and office; Arthur E. Rowe & Assistants, 1743 E. 25 St., Cleveland, engineers.

LIMA, O.—Standard Oil Co. of Ohio, Midland Bldg., Cleveland, has awarded a contract to M. W. Kellogg Co., 225 Broadway, New York, for a solvent refining plant for lubricating oils and a solvent deasphalting unit, and to Lummus Co., 420 Lexington Ave., New York, for four other units of solvent refining plant; total cost, $13 million.

LORAIN, O.—National Tube Co. has started construction of its bar and billet mill and will install new rolling mills and finishing stands.

MANSFIELD, O.—Martin Steel Products Co., Carl Oberlin, president, 111 W. Longview Ave., was damaged by a $100,000 fire which destroyed electrical wiring and large quantities of bolts used in the manufacture of metal farm buildings.

NILES, O.—Wilder Mfg. Co., which does commercial pickling and makes draft diverters for furnaces, was seriously damaged by fire with a loss of $150,000 to the buildings.

NILES, O.—Mahoning Valley Steel Co., John P. Hosack, president, has awarded a $100,000 contract to Ohio Structural Steel Co., c/o owner, for an expansion and modernization program to include installation of two breakdown mills and four finishing mills.

SALEM, O.—Mullins Mfg. Co. has awarded a $200,000 contract to Heller-Murray Co., 222 Rayne Ave. W., Youngstown, for an office building for its factory.

SANDUSKY, O.—Philco Corp., Sandusky Division, Lionel Searls, manager, has started construction of a $1 million addition for the production of television sets.

WARREN, O.—American Welding & Mfg. Co., Warren, has awarded a $100,000 contract to Heller-Murray Co., 222 Rayen Ave. W., Youngstown, for construction of a factory addition for steel storage and shipping.

YOUNGSTOWN—Cool Ray Metal Awning Co. has been incorporated by Hazel Allshouse, Egon Field and Murray A. Nalder, attorney and agent, 901 Wick Bldg., to manufacture and deal in metal awnings.

OKLAHOMA

PONCA CITY, OKLA.—Continental Oil Co. has awarded a $7,750,000 contract to Bechtal Corp., San Francisco, for a refinery project.

OREGON

PORTLAND, OREG.—U. S. engineer is planning to spend $233,000 for construction of Multnomah county pumping plant, drainage district.

PENNSYLVANIA

NEW CASTLE, PA.—Welding Fitting Corp. is planning to begin converting the former Fisher Industrial Building on Butler Rd. where they will manufacture forged welding pipe fittings for the chemical and oil industries as well as general industry.

PRICES OF LEADING FERROALLOYS PRODUCTS

(*Continued from Page* 181)

packed 12.1c, ton lot 13.55c, less ton 15.2c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 13.0c per lb of contained Si, carload packed 14.3c, ton lot 15.45c, less ton 16.7c. Delivered. Spot, add 0.3c.

80-90% Ferrosilicon: Contract, carload, lump, bulk 14.65-15c per lb of contained Si, carload packed 15.9c, ton lot 16.9c, less ton 18.05c. Delivered. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.). Add 0.7c to 85% ferrosilicon prices.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 16.5c per lb of contained Si, carload packed 17.7c, ton lot 18.65c, less ton 19.7c. Delivered. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.) Add 0.7c to above 90-95% ferrosilicon prices.

Silicon Metal: (Min. 97% Si and 1% max. Fe.). C.l., lump, bulk, regular 19.0c per lb of Si c.l. packed 20.2c, ton lot 21.1c, less ton 22.1c. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing min. 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump per lb cl 6.90c; ton lots packed, 7.40c; 200 to 1999 lb, 8.15c, smaller lots 8.65c; or, lump, carload, bulk, 8.40c per lb of alloy, packed c.l. 9.20c, ton lots 9.30c, 200 to 1000 lb 9.65c, less 200 lb 10.15c per lb of alloy. Delivered. Spot up 0.5c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3¾ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 13.75c per lb of briquet, carload packed 14.45c, ton lot 15.25c, less ton 16.15c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk, 10.00c per lb of briquet, c.l. packaged 10.8c, ton lot 11.6c, less ton 12.5c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 10.0c, per lb of briquet, c.l. packed 10.8c, ton lot 11.6c, less ton 12.5c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 5.75c per lb of briquet, c.l. packed 6.55c, ton lot 7.35c, less ton 8.25c. Delivered. Spot, add 0.25c.

(Small size—weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 5.90c, c.l. packed 6.70c, ton lots 7.50c, less ton 8.40c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) 80.00c per pound of Mo contained. f.o.b. Langeloth, Pa.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18%, and Si 53-59%). Contract, carload, lump, bulk 19.25c per lb of alloy, carload packed 20.05c, ton lot 21.55c less ton 22.55c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 17.9c per lb of alloy, carload packed 19.1c, ton lot 21.0c, less ton 22.5c. Delivered. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max., Si 4% max., C 0.10% max.). Contract, ton lots, 2" x D, $1.40 per lb of contained Ti; less ton $1.45. (Ti 38-43%, Al 8% max., Si 4% max., C 0.10% max.). Ton lot $1.28, less ton $1.35. F.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot add 5c.

Ferrotitanium, High-Carbon (Ti 15-18%, C 6-8%). Contract, $160 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21% C 3-4.5%). Contract, $175 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

VANADIUM ALLOYS

Ferrovanadium: Open Hearth Grade (Va 35-55%, Si 8-12% max., C 3-3.5% max.). Contract, any quantity, $2.90 per lb of contained Va. Delivered. Spot, add 10c. **Crucible-Special Grades** (Va 35-55%, Si 3.25-4% max., C 0.5-1% max.), $3. **Primos and High Speed Grades** (Va 35-55%, Si 1.50% max., C 0.20% max.), $3.10.

Vanadium Oxide: Contract, less carload lots, $1.20 per lb of contained V_2O_5, f.o.b. Bridgeville, Pa. Spot, add 5c.

Grainal: Vanadium Grainal No. 1, 93c; No. 6, 63c; No. 79, 45c; all f.o.b. Bridgeville, Pa., usual freight allowance.

TUNGSTEN ALLOYS

Ferrotungsten: (W 70-80%). Contract, 10,000 lb W or more, $2.25 per lb of contained W; 2000 lb W to 10,000 lb W, $2.35; less than 2000 lb W, $2.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Contract or spot, 1000 lb or more, $2.90 per lb of contained W; less than 1000 lb W, $3.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloys: (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Contract, c.l., lump, bulk 6.6c per lb of alloy, c.l. packed 7.35c, ton lot 8.1c, less ton 8.95c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Contract, carload, lump, packed 20.25c per lb of alloy, ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Contract, 100 lb or more. 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered. Spot, add 5c.

Borosil: (3 to 4% B, 40 to 45% Si), $6.25 per lb contained B, f.o.b. Philo, O., freight not exceeding St. Louis rate allowed.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 0.90 to 1.15%). Net ton to carload, 8c per lb, f.o.b. Suspension Bridge N. Y., freight allowed same as high-carbon ferrotitanium.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Mn 5% max. Si 8% max., C 0.5% max.). Contract, ton lot, 2" x D, $2.75 per lb of contained Cb, less ton $2.80. Delivered. Spot, add 10c.

CMSZ Mixes: (No. 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 0.75-1.25%, C 3.50-5%). Carload, 12 M x D, carload packed 19.0c per lb of material, ton lot 19.75c, less ton 21.0c. Delivered.

Sileaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, Boron 0.55-0.75%). Carload, packed, 1" x D, 43c per lb of alloy, ton lot 45c, less ton 47c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Contract, carload, packed, ½" x 12 M, 16.5c per lb of alloy, ton lots 17.25c, less ton 18.5c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 16.50-17.00c per lb of alloy; ton lots 17.90-18.00c; less ton lots 19.40-19.50, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%; V-7, Cr 28-32%, Si 15-21%, Mn 14-16%). C.l. packed, 14.25c per lb of alloy; tons lots 15.75c; less ton lots 17.00c, f.o.b., Niagara Falls, N. Y.; freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al). Packed, lump, carload 11c, ton lots 11.25c, smaller lots 11.75c per lb alloy; freight not exceeding St. Louis rate allowed.

Ferrophosphorus (23-25% based on 24% P content with unitage of $3 for each 1% of P above or below the base): Gross tons per carload, f.o.b. sellers' works, Mt. Pleasant, or Siglo, Tenn.; $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb. contained Mo, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c. Effective Jan. 1, 1949, price will be $1.10 Langeloth.

Technical Molybdic-Oxide: Per lb, contained Mo, f.o.b. Langeloth, Pa., packed in bags containing 20 lb of molybdenum, 80.00c.